January 4, 1954

STEEL

THE WEEKLY MAGAZINE OF METALWORKING

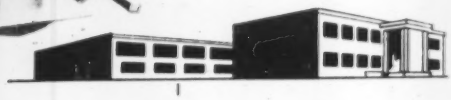
1954 METALWORKING YEARBOOK ISSUE

COMPASS FOR COMPETITION—p. 113

CONTENTS—PAGE 5

CHECK THESE SAVINGS

- LOWER INVENTORY INVESTMENT
- LESS SPACE NEEDED
- LOWER HANDLING COST
- LESS DAMAGE AND OBSOLESCENCE
- LOWER ACCOUNTING COSTS
- LESS INSURANCE NEEDED



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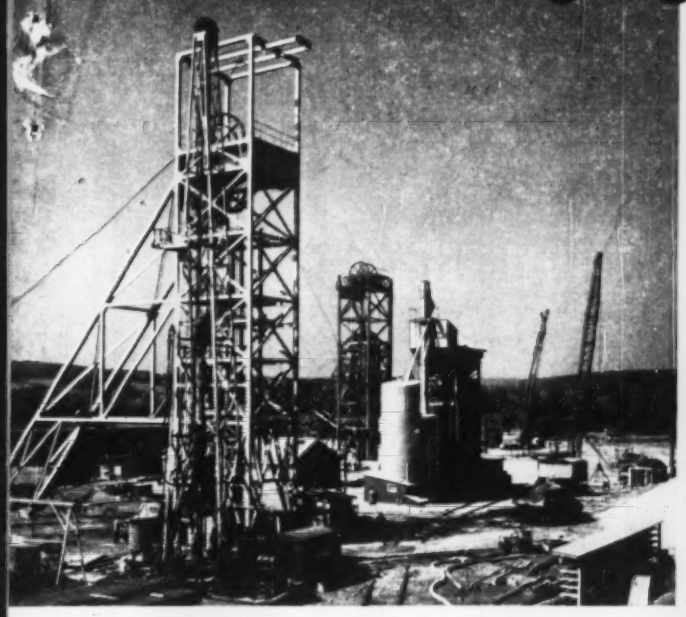
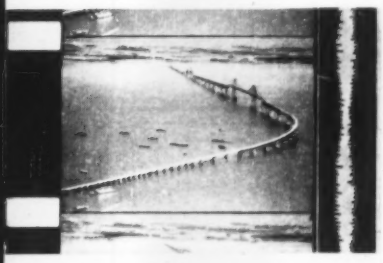
From 1953 Highlights at Bethlehem



DEVELOPMENT PROCEEDS AT GRACE MINE. The year saw steady progress in the development of Bethlehem's new magnetite ore property in eastern Pennsylvania, the Grace Mine near Morgantown. The main haulage shaft is well on its way to an ultimate depth of 2500 ft, and a second shaft for men and materials has been started. Most of the surface buildings have been largely completed and hoisting engines have been installed. When in full operation a work force of about 1250 will be required.

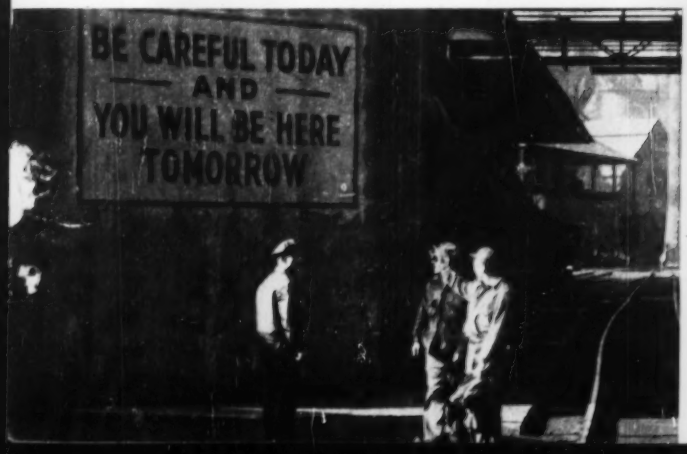
At the same time, development of the new ore mine at Marmora, Ont., Canada, has also gone forward.



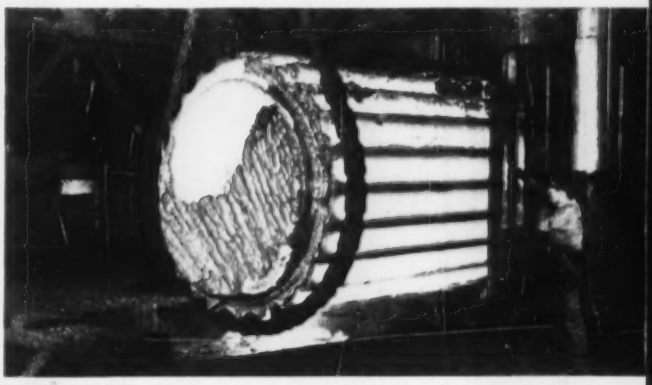
NEW FILM SHOWS SPANNING OF CHESAPEAKE. The erection of more than four miles of steel superstructure for the Chesapeake Bay Bridge by Bethlehem's Fabricated Steel Construction Division is shown in a new color movie, "Steel Spans the Chesapeake." This 16-mm sound film is now available to the public for showings before interested groups.

NEW PROGRESS IN SAFETY. 1953 brought gratifying recognition of safety accomplishments. During the year 32 Bethlehem operations received awards from the National Safety Council in recognition of outstanding safety performances.

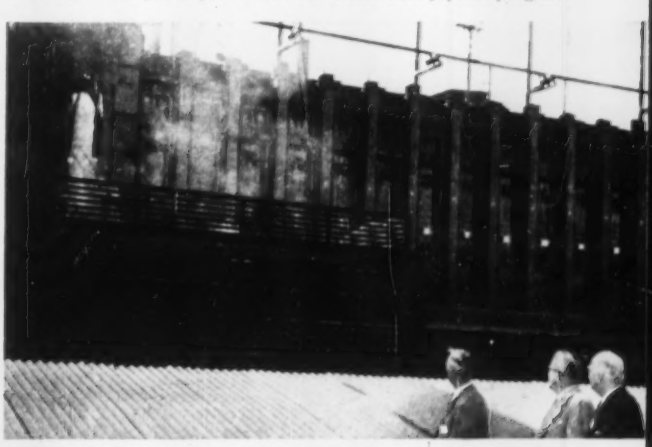
In addition, in the large-steel-plant division of the Metals Section contest, first, second and third places went, respectively, to the Bethlehem, Johnstown and Lackawanna plants. This award makes the eleventh straight year that a Bethlehem plant has won the contest in this division.



GROWING TREND TOWARD HIGH-STRENGTH BOLTING. Steel erectors are more and more discovering the saving in time and other advantages of joining structural members with high-strength bolting instead of field-driven rivets. One result: high-strength bolts are moving in steadily-mounting volume from our fasteners plants to meet the growing demand.



350-TON INGOT. This giant, one of the largest ingots ever made, with a diameter of 11 ft 2 in. and weighing better than 700,000 lb, yielded the steel for a forging 70 ft long, to form one of the columns of a 25,000-ton press, part of the Air Force heavy-press program.



NEW COKE OVEN BATTERY. The picture shows the first "push" of coke as it tumbled from the newly-completed battery of 80 by-product ovens at the Bethlehem Plant. This new battery has added 1300 tons daily to the plant's coke capacity.

BETHLEHEM STEEL

TOCCO-brazing drive shaft assemblies—two at a time. Photo—courtesy Mechanics Universal Joint Division of Borg-Warner Corporation.

with TOCCO* Induction Brazing

The shift from welding to TOCCO* induction brazing of the drive shaft assembly pictured here is typical of savings accomplished by TOCCO in over a thousand of America's leading metal-working plants. If you have brazing, soldering, heat-treating or heating for forming or forging operations in your plant TOCCO can probably save you money too.

COSTS DOWN 67%—Mechanics Universal Joint Division of Borg-Warner reports a 67% cost reduction in TOCCO-brazing yokes to tubing in the manufacture of power transmission shafts. Formerly, parts were hand-welded.

PRODUCTION UP 400%—Automatic TOCCO increases production from 11 to 45 pieces per hour—400% faster than former method. In addition TOCCO-brazing produces a cleaner, neater joint than possible with previous method.

TOCCO Engineers are glad to survey your plant, without obligation, of course, to determine where TOCCO Induction Heating can speed your production and cut your manufacturing costs.

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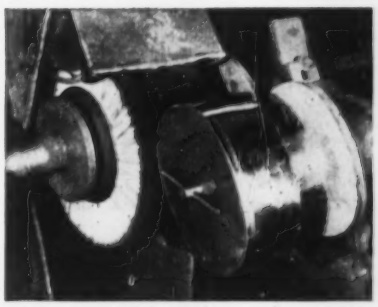
X unmarks the spot...at 1750 rpm

Heavy Presses form these waffle iron lids. But they leave draw marks on the cold rolled steel . . . marks which must be removed before the lids take their nickel plating bath.

That's when the Osborn Fascut® brushing sections go to work for this appliance manufacturer. Under those waffle-iron panels are wooden forms, attached to the table which moves the panels back and forth under the rotating (1750 rpm) Fascut brushes. A flexible back-up roll regulates the pressure during brushing.

Not only do the Fascut brushes blend away the draw marks quickly... but the panels are also finished at the same time. This eliminates a time-consuming hand-finishing operation. Now the manufacturer produces 250 panels an hour, *twice the output* before the Osborn Fascut brushing sections were adopted.

Whatever *your* product . . . metal, rubber, plastic or other material . . . it will pay you to have your **O**sborn **B**rushing **A**nalyst study your operations to suggest the money- and time-saving techniques made possible by Osborn power brushing methods. Call or write *The Osborn Manufacturing Company, Dept. G-14, 5401 Hamilton Avenue, Cleveland 14, Ohio.*



300% greater wear is obtained from the Osborn Monarch Brushes used here than with the Tampico brushes used previously. In this push-button brushing operation, a smooth lustrous finish is produced prior to nickel plating.

FREE:
New booklet on deburring with Osborn Power Brushing. Write for your copy.

Osborn Brushes

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about Tenn-Sil sand additive

Try it! Ask your nearby TENNESSEE metallurgical engineer for a sample of Tenn-Sil sand additive. Discover for yourself how it will help you reduce casting defects.

Helps cut casting defects

● Foundries are finding TENNESSEE Tenn-Sil the key to better castings. This sand additive controls expansion in the mold and minimizes casting defects. It is available in two types:

Tenn-Sil No. 1 . . . replaces wood floor and sea coal in the sand mix. Graded to approximately AFA No. 100 size. By increasing hot deformation it helps eliminate defects such as rat tails, buckles and certain types of scabs. It is also used for insulating the molten metal in the ladle when delays in pouring occur.

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Vol. 134 No. 1

STEEL
THE WEEKLY MAGAZINE OF METALWORKING

JANUARY 4, 1954

1954 METALWORKING YEARBOOK ISSUE

$2.00 PER COPY

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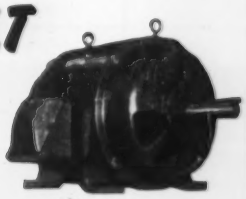
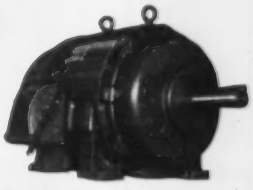
RELIANCE
Precision-Built
MOTORS

BUILT



Protected Open

FOR



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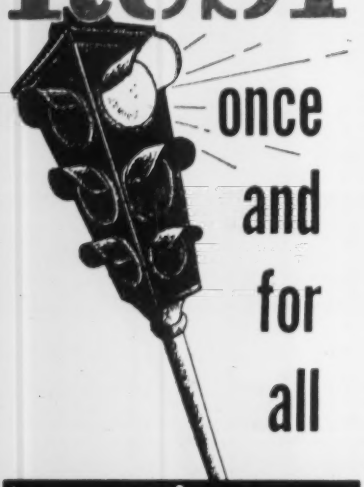

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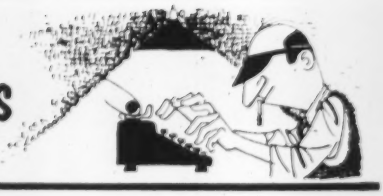

At Your Service in 1954

Well, here it is . . . your 1954 *Metalworking Yearbook!*

During the past four weeks, we have attempted to whet your appetite for the *Yearbook* by previewing selected features we thought you would find particularly helpful.

We've purposely saved one 'till last. We're not going to tell you much about it even now except to direct your attention to page 113 of this issue. There you will find "Compass for Competition."

This stimulating and challenging keynote editorial was written by Walter Campbell, managing editor. You will remember Walt for his other thought-provoking *Yearbook* efforts, "Metalworking's Destiny" which appeared in 1952 and was later read before the U. S. House of Representatives and reprinted in the *Congressional Record;* also, "Now Is the Time" which kicked off STEEL's 1953 Program for Management series in last year's *Yearbook.*

"Compass for Competition" blazes a trail for metalworking in 1954. Is your business compass pointing to a profitable year?

Compass for Competition

A copy of the most recent STEEL readership check conducted by Daniel Starch & Staff, consultants in business research, found its way to our orange crate desk just yesterday. We donned our green eye shade and scanned it quickly, that is, until we came to the section headlined "Verbatim Comments." We threw our fast-reading course text out the window and geared our reading speed into low. Here are some of the statements we found:

"We like STEEL. It is not only interesting but also educational . . . I enjoy the 'Specifications Handbook' and use it constantly. I always read 'Mirrors of Motordom'—I think the writer has quite a sense of humor and his information is ahead of the general press . . . I particularly enjoy 'Men of Industry' and 'Market Outlook.' I think the magazine generally is just grand . . . I find its articles excellent and refer to back issues quite often, quoting things I have read to my classes in engineering.

"The 'Metalworking Outlook' is particularly important to us; it shows the straws in the wind. I read this book regularly . . . STEEL is well catalogued. Easy to find what I look for—I usually read it first and circle articles in red pencil or blue for our engineering and production departments . . . Best magazine of its type . . . Excellent advertisements. Read the ones that pertain to my line of work really more than the rest of the magazine."

And so the report went, on and on and on. Completely intrigued by the generosity and sincerity of these comments, we decided to do a little mental sleuthing to find out which of STEEL's features were most often mentioned as favorite reading. Perhaps our findings jibe with your own reading preferences. If not, it could be that another look at some of these might uncover new interests for you.

Among the 150 readers who made comments, the following were the most popular reading: Earl Shaner's editorials, "Mirrors of Motordom," "Business Trends," "Metalworking Outlook," "Technical Outlook" and technical articles, "Market Outlook," and "Men of Industry."

There were many words of praise for STEEL's general layout and art styling and for the readability of the headlines and other typography.

All in all, it was a most gratifying report. We liked particularly the fact that each of our many magazine features came in for some measure of praise from at least one of the readers checked.

During the coming year, we will continue to give you the kind of publication that will command your interested readership and your kind words.

A very happy and prosperous New Year to you all.

Shrdlu

(Metalworking Outlook—Page 105)

Ingersoll Steel

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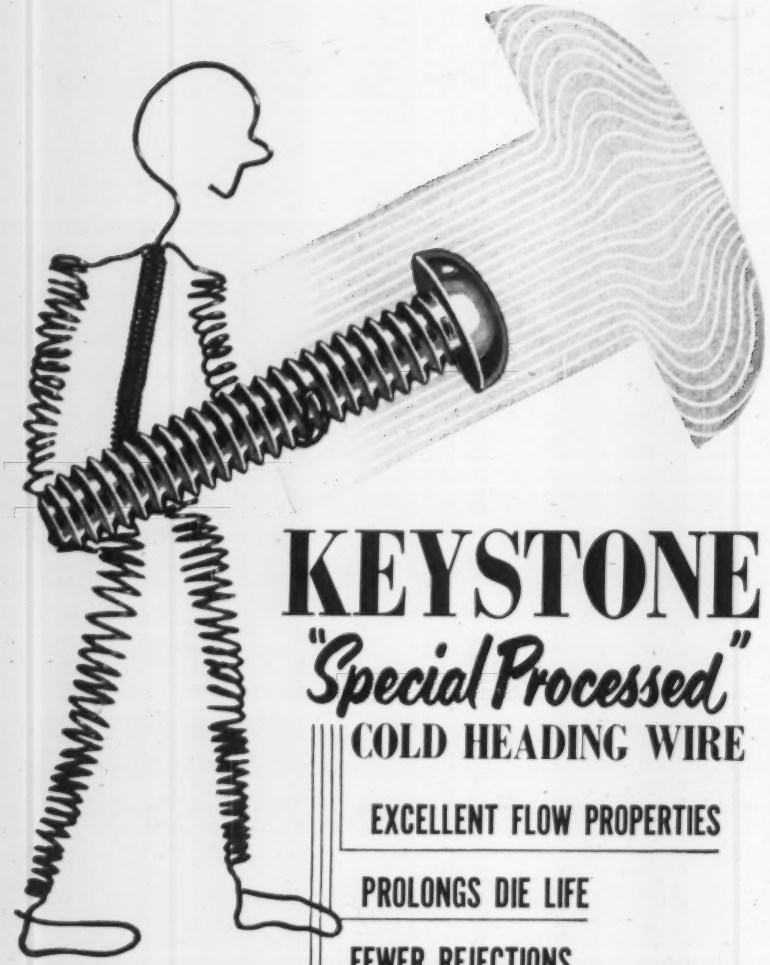

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LETTERS
TO THE EDITORS

Safety Program Story a Hit

We would like to obtain six tear sheets of the article "What About Your Safety Program?" (Nov. 30, p. 101).

F. B. Newbert
American Brake Shoe Co.
New York

Please send us five tear sheets of "What About Your Safety Program?"

Bruce W. Owen
plant engineer
Metaloid Co.
Cleveland

Please send 12 tear sheets . . .

M. Barthel
Stewart-Warner Corp.
Chicago

. . . on the first page of the article appears an illustration of a photoelectric guard system on a press. Would you please tell us who is the manufacturer of the photoelectric components featured therein?

G. E. Henning
Point Breeze Works
Western Electric Co.
Baltimore

• *A company that makes this type of equipment is: Electronic Control Corp., Detroit 7.—ED.*

. . . if possible, may we have the name of the manufacturer of barrier guards for punch presses?

R. H. Bostwick
Samsonite Luggage Division
Shwayder Bros. Inc.
Denver

• *One of the manufacturers is: Searjeant Metal Products Co., Mendon, N. Y.—ED.*

In your article "What About Your Safety Program?" there was mention of a number of different types of safety guards on presses, two-handed trippers, electrically and electronically operated devices and other mechanical devices. We would appreciate very much your sending us the names of the companies that manufacture these different safety devices.

S. H. Simowitz
American Metal Spinning & Stamping Co.
New York

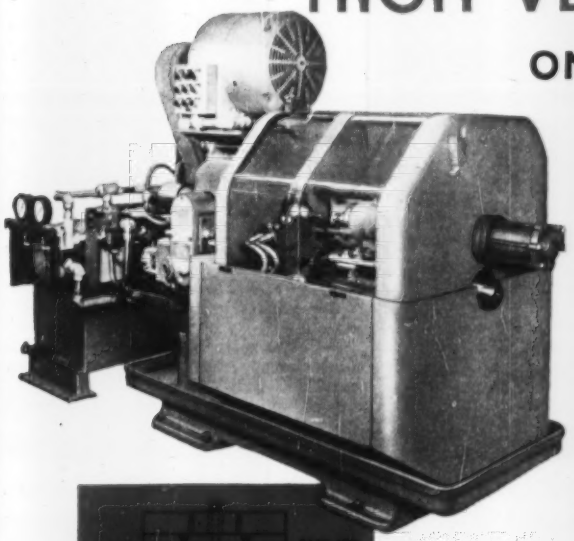
• *A partial list of the companies includes: Electronic Control Corp., Detroit 7; Security Controls Inc., Buffalo; and Positive Safety Mfg. Co., Cleveland. For more complete listings and further information on safety programs, all correspondents are referred to American Standards Association Inc., New York, and Pressed Metal Institute, Cleveland 20.—ED.*

Complete Code Desired

I was very much interested in your article "Canadian Plan for Birthmark-

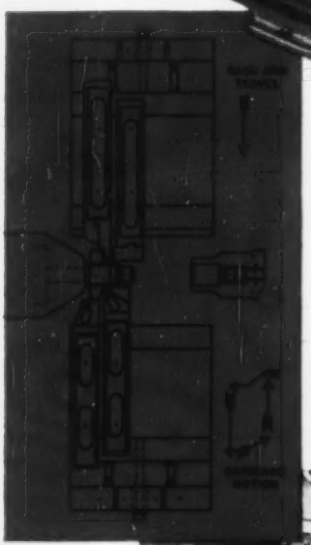
Please turn to p. 12

AUTOMATICITY BACKS UP HIGH VELOCITY TURNING ON FAY AUTOMATICS



SIDE GEARS
18 Seconds Floor to Floor — 635 SFM

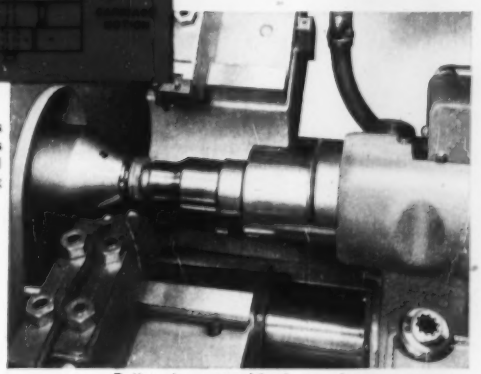
Two 8" Fays, with Automatic Sequential Control, machine all exterior surfaces of the blanks in two operations; one machine for each. The major diameter is 2-15/16" and floor to floor time is approximately 18 seconds in each operation.



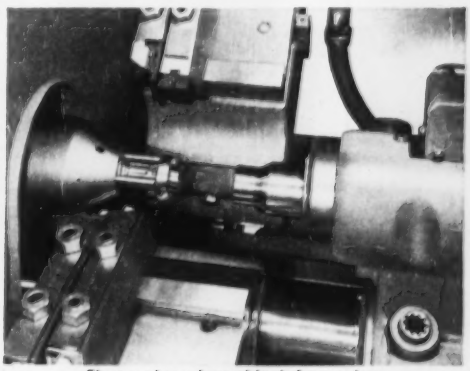
Automatic Cycle—The machines are equipped with automatically operated splash guards and automatically air-operated tailstock rams for pressing the blank onto a splined arbor equipped with automatically operated ejector pins.

The operator places the blank on the end of the arbor, and pushes the cycle start button. *Automatically, the guard closes, the tailstock ram presses the piece onto the arbor and then retracts. The carriage turns, the back arm faces, and at the end of the cuts, ejector pins push the piece onto the loading section of the arbor* from which it is removed manually.

FIRST OPERATION:
Note intricate movements of the carriage, which turns the hub, back angle and major diameter. The back arm faces and forms.



Tailstock presses blank on arbor



Ejector pins release blank from arbor

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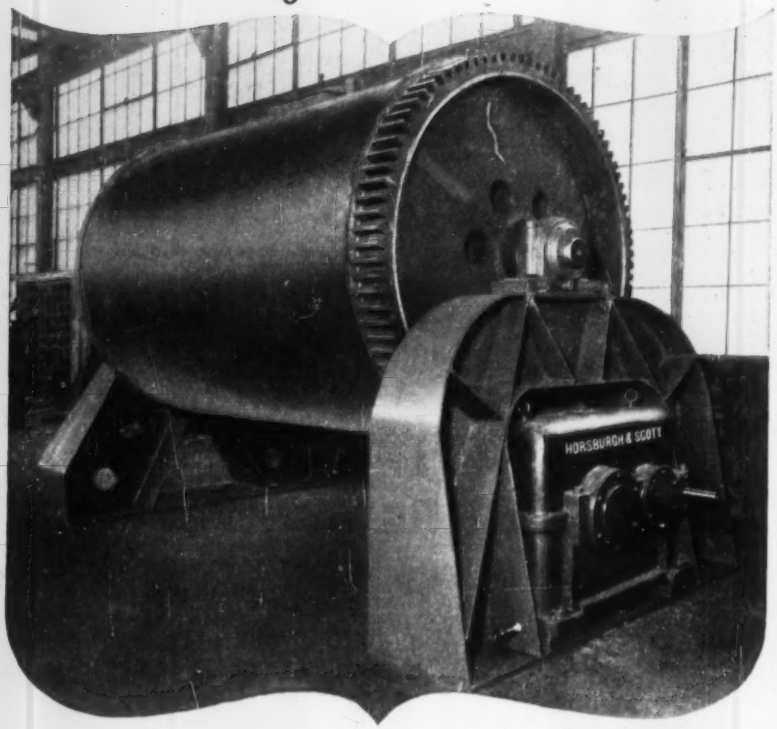

• Since 1940 the Horsburgh & Scott Herringbone Speed Reducer illustrated above...driving an Epworth Manufacturing Company Ball Mill in a large paint manufacturing plant... has been in operation with *no* repairs necessary. The service is severe with heavy starting load and the machine operates continuously for periods of 24 to 72 hours. As compared with the old drives the results are: greatly reduced maintenance and space... greater safety is also an important feature. H & S Speed Reducers offer many savings and advantages throughout the range of industry...it will pay you to investigate.

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Send note on Company Letterhead for Speed Reducer Catalog 46

LETTERS

Concluded from p. 10

ing Steels" (Nov. 16, p. 119). I would like to obtain a copy of the complete code.

M. Polay
Hawthorne Works
Western Electric Co. Inc.
Chicago

• *Write to E. T. Watterud, committee secretary, Canadian Government Specifications Board, National Research Council, Ottawa 2.—ED.*

Boon to Small Business

We have read with interest the previous articles in STEEL's Program for Management series during the past year. Various portions have been of assistance. The tenth article in the series "Marketing Research" (Dec. 7, p. 125) is tops.

As a small firm we rely on employee suggestions for our own improvement. If it is at all possible, we would appreciate 50 copies of this excellent article, so that it can be put into the hands of all of our people.

Alvin Sulman
C. M. Lovsted & Co. Inc.
Seattle

We would appreciate your sending us a tear sheet of this article . . .

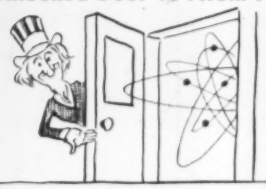
M. W. Sampson
Ramseyer & Miller Inc.
New York

Please send two copies . . .

M. A. Thompson
U. S. Steel Corp.
Pittsburgh

• *Sent.—ED.*

Unlocked Door to Atom Power



Congratulations on your fine article "Atomic Power Latch String Is Out" (Nov. 30, p. 98). As you know, we are interested in the increased usage of radioactive isotopes because it was pointed out by an AEC scientist at our recent BRAB-PEI conference that porcelain enamel is an excellent material for certain laboratory furniture such as fume hoods and ducts, glove boxes, etc., because it decontaminates readily after exposure to radioactive isotopes.

William N. Brinker
administrative assistant
Porcelain Enamel Institute
Washington

• *STEEL carried that report by G. W. Parker, chief chemist, Oak Ridge National Laboratory, Oak Ridge, Tenn., in its story "Versatile Porcelain Enamel" (Nov. 23, p. 47).—ED.*

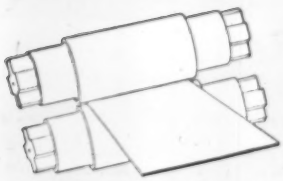
'How To' Draws Interest

We would like to get three copies of the article "How To Tell a Good High Speed Tool" (Nov. 23, p. 88).

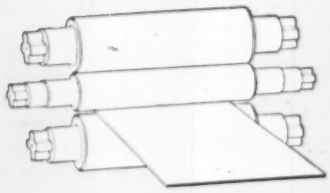
Wayne O. Pangborn
production models engineer
Wright Aeronautical Division
Curtiss-Wright Corp.
Detroit

Please send six tear sheets . . .

Allen L. Curtis
Deere & Co.
Moline, Ill.



Roll STRIP, SHEET, PLATE with



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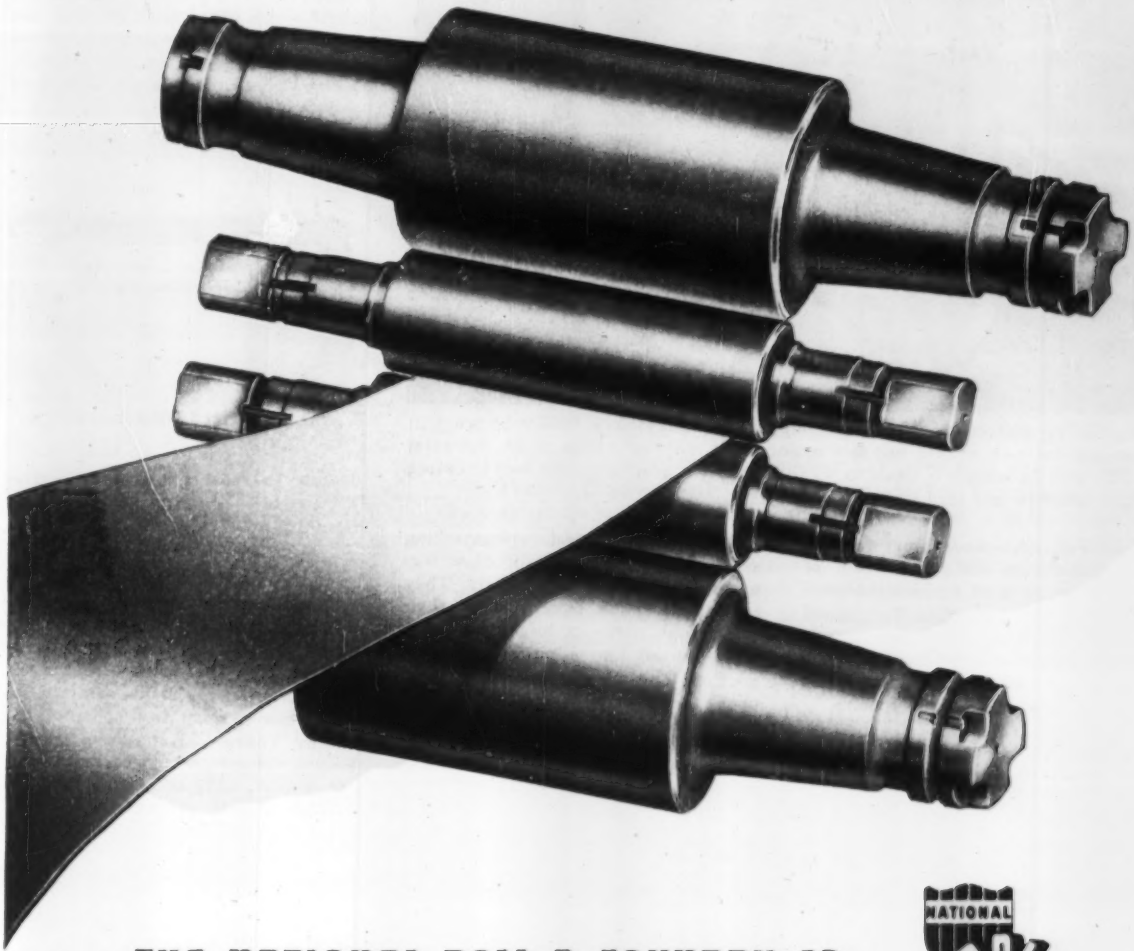

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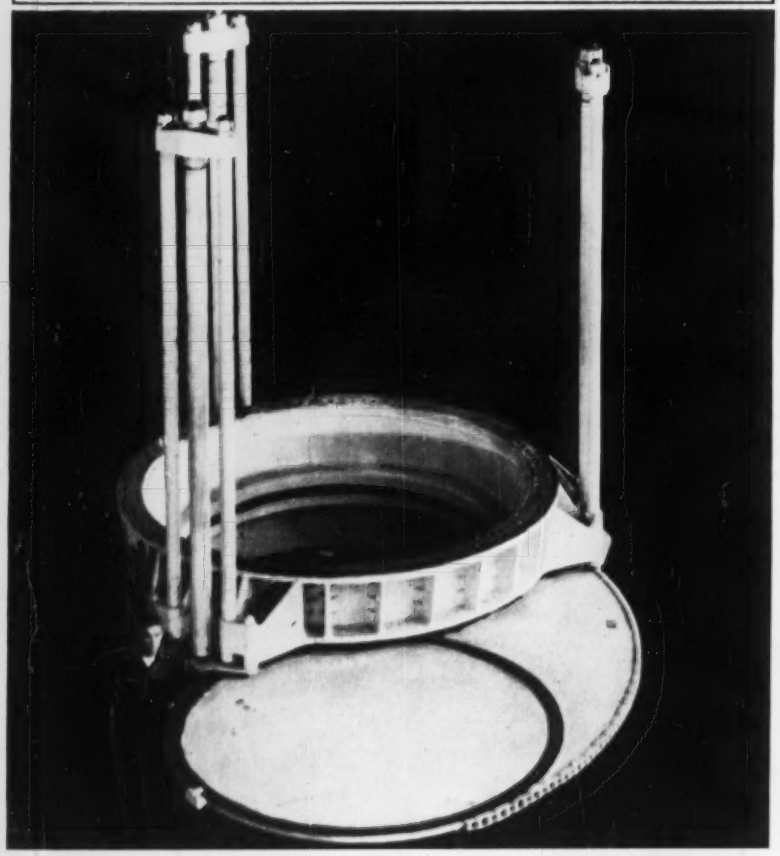
HOW A FORCE OF NATURE IMPROVES STEEL MILL SAFETY



Designed to protect men and equipment, this heavy duty Bailey Valve was produced for one of the nation's major steel makers. Although its diameter is 120" and its weight is close to 42,000 lbs., it is precisely machined to assure a tight, positive gas seal.

AN UNFAILING force of nature—the linear expansion and contraction of steel—is being used to increase steel mill safety. This powerful force, applied to Bailey Thermal Expansion Goggle Valves, provides a safe, dependable means of positive shutting off large gas mains in emergencies or for repairs.

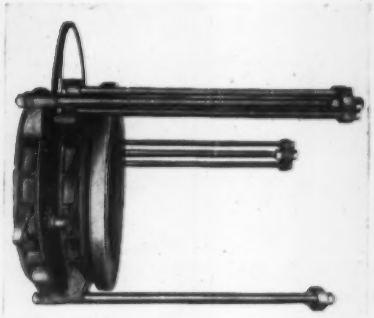
The Function of Goggle Valves

Ranging in diameter from 36" to 120", this type of valve long has been industry's standard method for controlling gas in the large mains for blast furnaces, gas washers and boilers. They take their name from one of their component parts—a large, moveable plate shaped like a pair of aviation goggles. This plate has one "goggle" open, the other of solid steel. When a gas main is in operation, the open goggle allows gas to flow through it freely; when the gas is to be shut off, the plate is moved until the closed goggle blocks the main, forming a tight, leak-proof seal.

BAILEY THERMAL EXPANSION GOGGLE VALVES

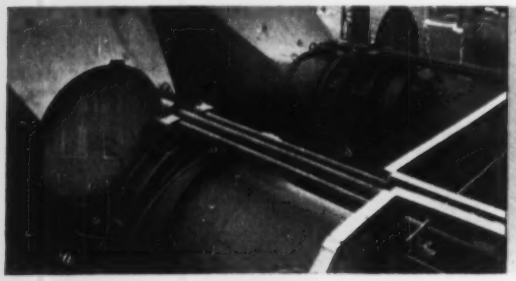
Safety and efficiency in closing the larger sized gas mains are provided by Bailey Thermal Expansion Goggle Valves. In them, the powerful force of linear expansion and contraction of three steel tubes is used to free or clamp the goggle plate—providing an absolutely gas-tight seal.

In operation, steam is passed into the tubes, which are spaced evenly around and perpendicular to the rigid steel flanges of the valve. The resulting expansion frees the heavy goggle plate so it may be swung to the open or closed position. When the steam is shut off, contraction of the tubes takes place, closing the flanges tightly against the goggle plate. Since both sides of the plate are machined to conform to the machined edges of the valve flange, Bailey Valves are leak-proof in both open and closed positions.



Bailey Thermal Expansion Goggle Valves are produced in diameters from 36" to 120".

Sound design and precision manufacture are combined in these valves to assure the ultimate in safety and reliability. They have been thoroughly proved on the gas mains of blast furnaces, gas washers and boiler plants. Bailey Thermal Expansion Goggle Valves are completely dependable in hot or cold, dirty or clean gas mains.



These valves are in service on an Elex Precipitator. In this view the goggle plates are in the open position.

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1221 Banksville Road

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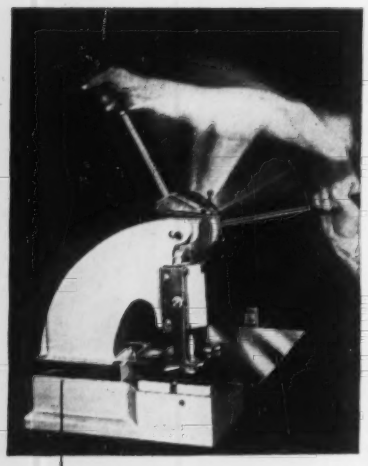

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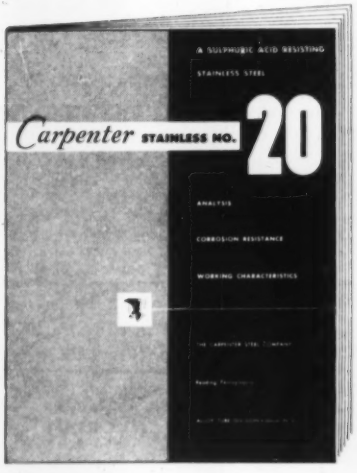

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ALODIZING

Alodizing with "Alodine,"* a new technique in the protective coating of aluminum, was made available for production-scale use in 1946. Since that time Alodizing has largely supplanted the more elaborate, costly and time-consuming anodic treatments in the aircraft and other industries.

Continuous and successful industrial use has clearly demonstrated the simplicity and economy of the Alodizing process as well as the effectiveness of the "Alodine" amorphous coatings, particularly as a base for paint. In fact, the paint-bond that Alodized aluminum provides has been found to be superior to that possible with chromic acid anodizing.

The corrosion-resistance of unpainted aluminum Alodized with "Alodine" Nos. 100 or 300 is excellent, easily meeting the requirements of Specification MIL-C-5541. However, a need for protection of unpainted aluminum, even better than that obtained with chromic acid anodizing, has long been recognized.

NEW IMPROVED "ALODINE" DEVELOPED By ACP RESEARCH CHEMISTS

Several years of intensive research have now led to a new type of "Alodine," designated as "Alodine" No. 1200. This new protective coating chemical forms an amorphous mixed metallic oxide coating of low dielectric resistance that provides unusually high corrosion-resistance for unpainted aluminum. In addition, it forms an excellent paint bond that approaches closely the high quality obtained with the earlier types of "Alodine."

After having been tested for conformance with Specification MIL-C-5541, "Alodine" No. 1200 is now about to go into production.

PROCESS DETAILS

"Alodine" No. 1200 is the only essential chemical needed to prepare the coating bath and the final rinse bath. One of its unique features is that it can be used in tanks in an immersion process, or, in a multi-stage power washer in a spray process, or, with a slight adjustment of pH, with brush or portable spray equipment in a manual process. This means that even where the simple production equipment is not available, or where touching up of damaged coatings previously Alodized or anodized is required, excellent protection and paint bonding can still be obtained with practically no equipment.

All three methods of application easily meet the requirements of Specification MIL-C-5541.

Process sequence for all three methods of application is the same as for other standard grades of "Alodine" such as Nos. 100, 300, and 600, viz.: 1. Pre-cleaning. 2. Rinsing. 3. Alodizing. 4. Rinsing. 5. Acidulated rinsing. 6. Drying.

Coating time in an immersion process ranges from 2 to 8 minutes and in a mechanized spray process is about 30 seconds. "Alodine" No. 1200 baths are operated at room temperatures (70° to 100°F.) and heating is required only if the bath has gotten cold after a "down" period.

RECOMMENDED USES FOR "ALODINE" No. 1200

"Alodine" No. 1200 is specifically recommended for coating wrought products that are not to be painted or are to be only partially painted; and for coating casting and forging alloys whether or not these are to be painted. "Alodine" Nos. 100 and 300 are still recommended for coating wrought products such as venetian blind slats, awnings, etc., that are invariably painted.

RESULTS OF TENSILE TESTS

This new "Alodine" not only retards visible corrosion and pitting, but as shown in the table below, the loss of ductility with "Alodine" No. 1200, both brush and dip, after 1000 hours salt spray was less than for chromic acid anodizing after 250 hours, and for "Alodine" No. 100 and a conventional chromate treatment after 168 hours exposure.

PROCESS	SALT SPRAY EXPOSURE	COMPLIANCE WITH TENSILE REQUIREMENTS OF MIL-C-5541
CHROMIC ACID ANODIZING	168 hrs.	passes
	250 hrs.	passes
	500 hrs.	fails
	1000 hrs.	fails
BRUSH "ALODINE" No. 1200	168 hrs.	passes
	250 hrs.	passes
	500 hrs.	passes
	1000 hrs.	passes
DIP "ALODINE" No. 1200	168 hrs.	passes
	250 hrs.	passes
	500 hrs.	passes
	1000 hrs.	passes
DIP "ALODINE" No. 100	168 hrs.	passes
	250 hrs.	fails
	500 hrs.	fails
	1000 hrs.	fails
CONVENTIONAL CHROMATE TREATMENT	168 hrs.	passes
	250 hrs.	fails
	500 hrs.	fails
	1000 hrs.	fails

*"Alodine" Trade Mark Reg. U. S. Pat. Off.

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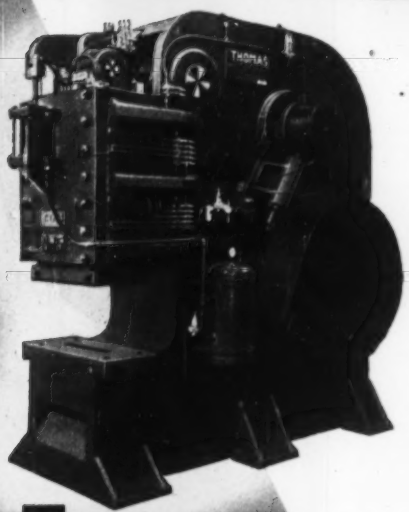

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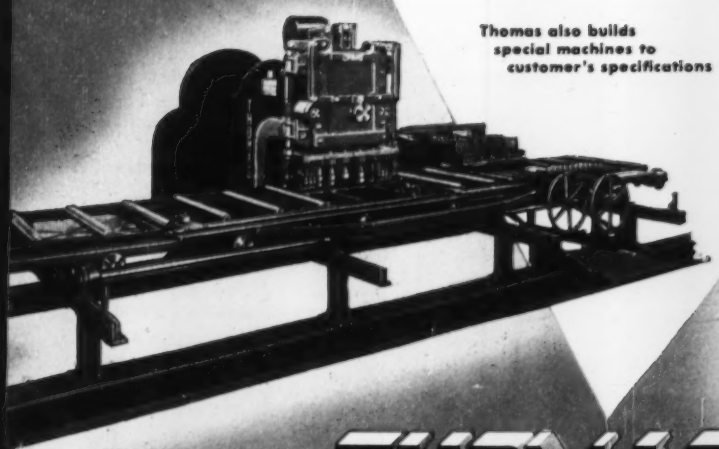

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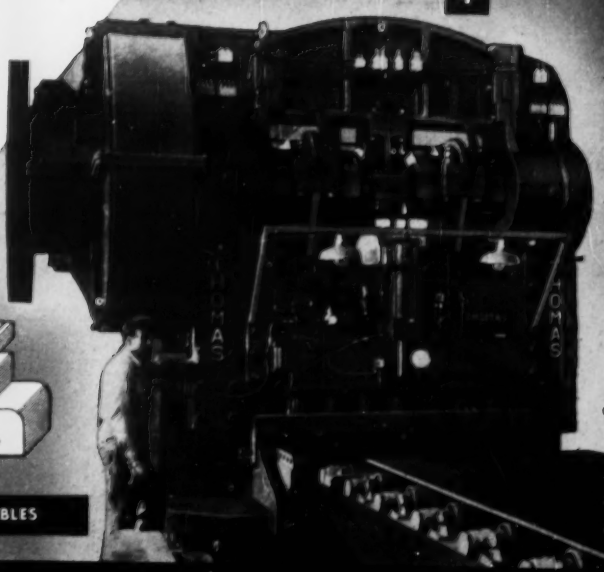

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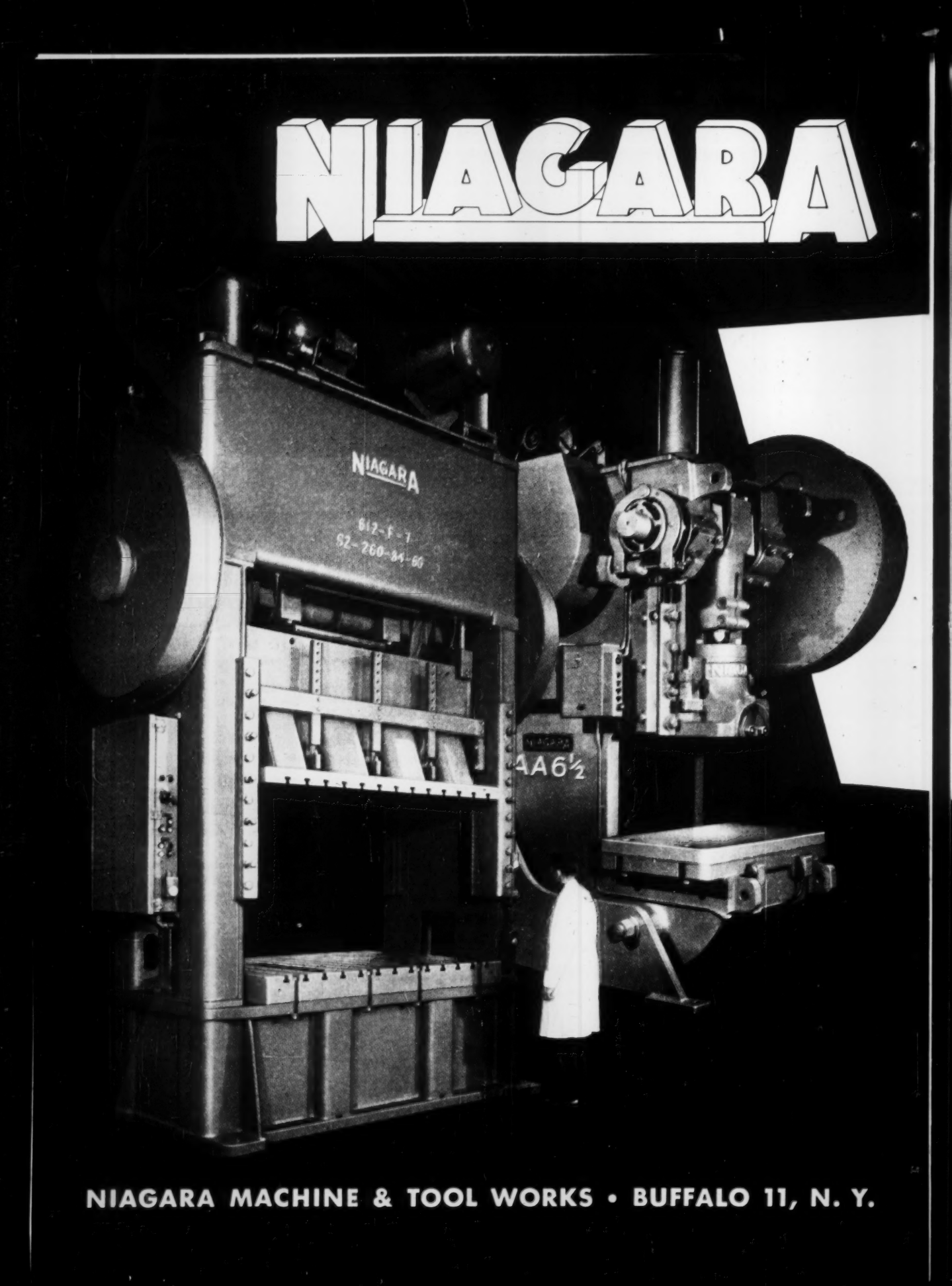

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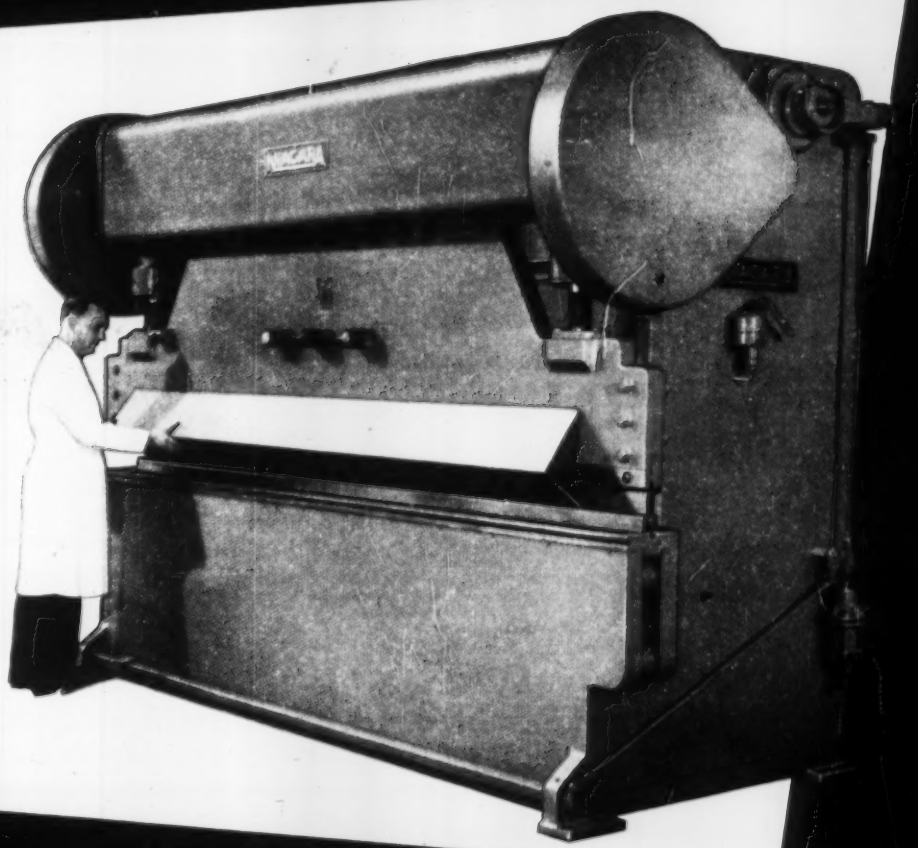

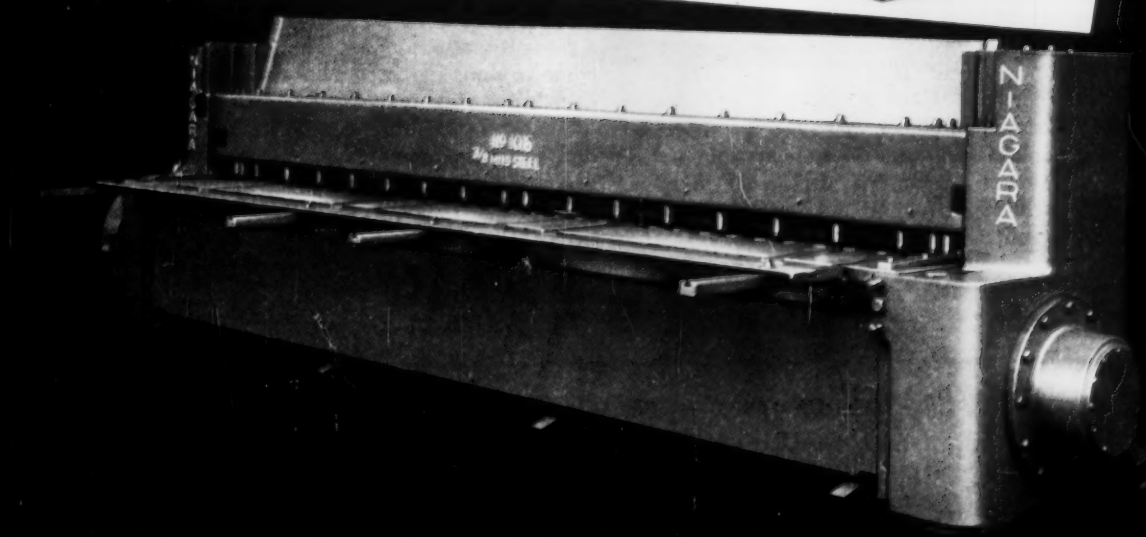

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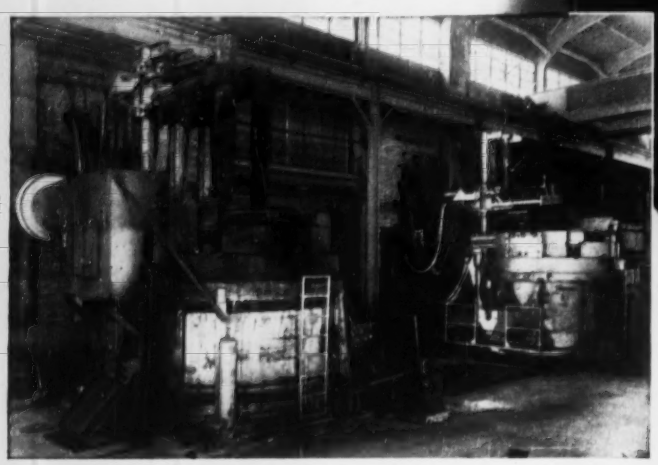

Twin Lectromelt Furnaces at Ingersoll Products Division of the Borg-Warner Corporation.

One of Ingersoll's new 18-ton Lectromelt Furnaces pours its first heat.

Lectromelt people, electrical equipment suppliers and the power company teamed up for fast action . . .

"The first of these two furnaces was installed in the fastest time I've ever seen . . . three weeks from foundation rack until we turned on the power for melting our first charge." These are comments of Neal Ruisard, Ingersoll's Chief Electrical Engineer.

To put in a new furnace or replace an old one and get into production fast, you'll need maximum help from your furnace builder. Lectromelt helps you minimize lost time (lost money) at installation. Every Lectromelt* Furnace is fully assembled on the Lectromelt factory floor. It's right before it's shipped! Then Lectromelt men come to your plant to help get your new furnace into action fast.

Write for Catalog No. 9 giving complete data on Lectromelt Furnaces. Request engineering or service information. Pittsburgh Lectromelt Furnace Corporation, 323 32nd Street, Pittsburgh 30, Pennsylvania.

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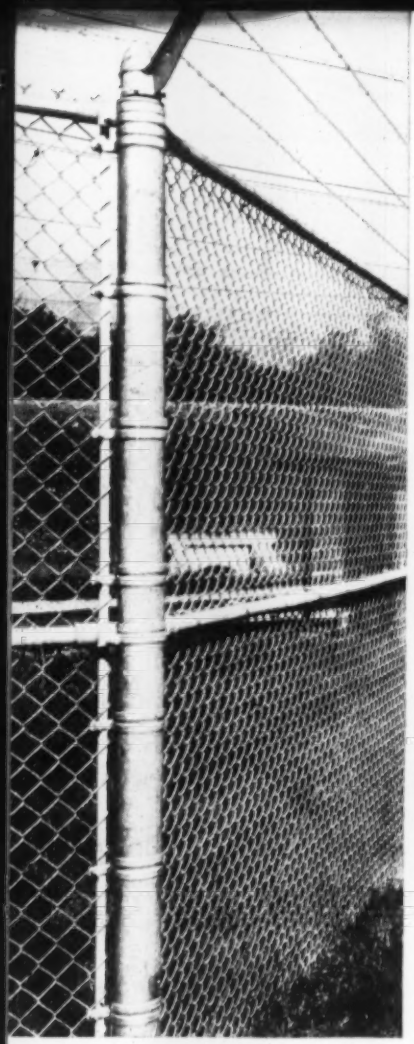
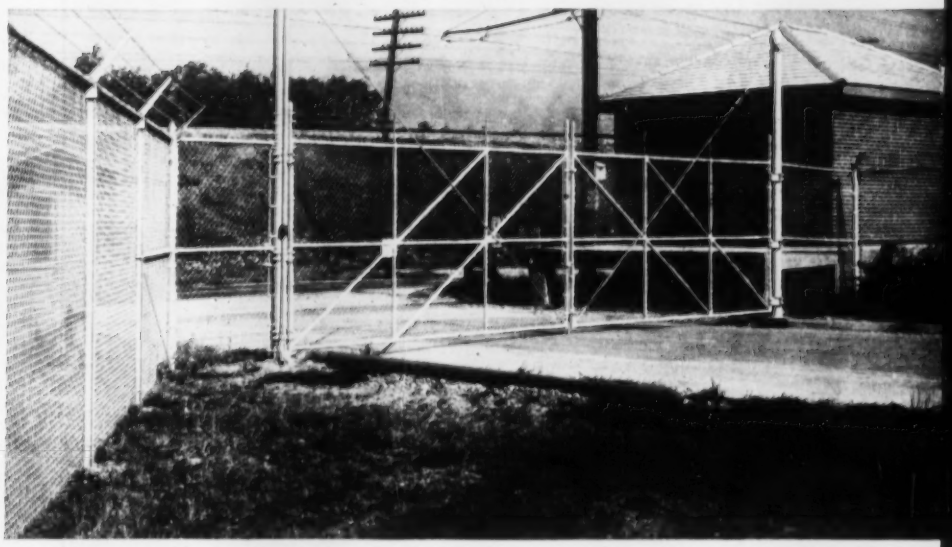
*REG. T. M. U. S. PAT. OFF.

WHEN YOU MELT... MOORE RAPID *Lectromelt*



• Time To Stop Holding Uncontrolled "OPEN HOUSE"...



FENCE PROPERTY IN... FENCE INTRUDERS OUT

● Your property and production tools are too valuable to risk avoidable theft, fire and accident losses. It's time to stop casual, disturbing "callers." Get permanent, low-cost *security and control* with Continental Chain Link Fence. This rugged, zinc-coated, weather-proofed fence provides control over entrance and exit . . . promotes safety, order and system. Full gage, anti-sag fabric withstands sudden shocks and strains . . . resists year-round temperature changes. Sturdy framework and fabric are secured by more post and rail ties. Get all these extra value Continental features for added years of plant security. For full details, write Continental at Kokomo, Ind.

You'll Be Glad You Talked With Continental

Send for Free Fence Manual

Get this FREE Continental Chain Link Fence Catalog describing every phase of fence making, features, erection and application.

CONTINENTAL STEEL CORPORATION
Kokomo, Indiana

Please send FREE copy of "Planned Protection" —complete manual on property protection.

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CONTINENTAL STEEL

CONTINENTAL STEEL CORPORATION

GENERAL OFFICES • KOKOMO, INDIANA

PRODUCERS OF *Manufacturer's Wire* in many sizes, shapes, tempers and finishes, including Galvanized, KOKOTE, Flame-Sealed, Coppered, Tinned, Annealed, Liquor Finished, Bright, Lead Coated, and special wire. ALSO, Coated and Uncoated Steel Sheets, Nails, Continental Chain Link Fence, and other products.

SET CUTTING SPEED HERE

There is a "best" cutting speed for machining with every combination of material and tool. Set that cutting speed here by turning the knurled ring.

SELECT DIAMETERS HERE

The operator merely turns the handwheel to the diameter of each successive cut. The Selector automatically shifts to the proper spindle speed.

Instant shifts to any one of 12 spindle speeds make it easy for the operator always to use the most efficient cutting speed. Reduces cutting time to a minimum with no time-wasting calculations and no physical effort.

Actuated by a mere touch to the wheel, the Speed Selector functions automatically, leaving the operator free to index the turret and present new tools to the work, thus reducing waste time between cuts. It's one of many features on Gisholt Turret Lathes that pay for themselves in a hurry.

GISHOLT MACHINE COMPANY

Madison 10, Wisconsin

THE GISHOLT ROUND TABLE
represents the collective experience of specialists in the machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.

TURRET LATHES • AUTOMATIC LATHES • SUPERFINISHERS • BALANCERS • SPECIAL MACHINES

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ALLOY CAST STEEL WHEELS

A Tremendous Range of Types and Sizes

F85 F-C

~~DOWN TIME~~

LAST 4 to 8 TIMES LONGER THAN ORDINARY WHEELS!

FARRELL-CHEEK STEEL CO.

HIGHEST QUALITY ELECTRIC FURNACE CARBON AND ALLOY STEEL CASTINGS

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ELEVATOR, CONVEYOR PARTS
Sprockets, Traction Wheels, Chains, Buckets, Rollers, Idlers, Bushings.

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"True Tooth" Gears and Pinions, Sheaves and Wheels.

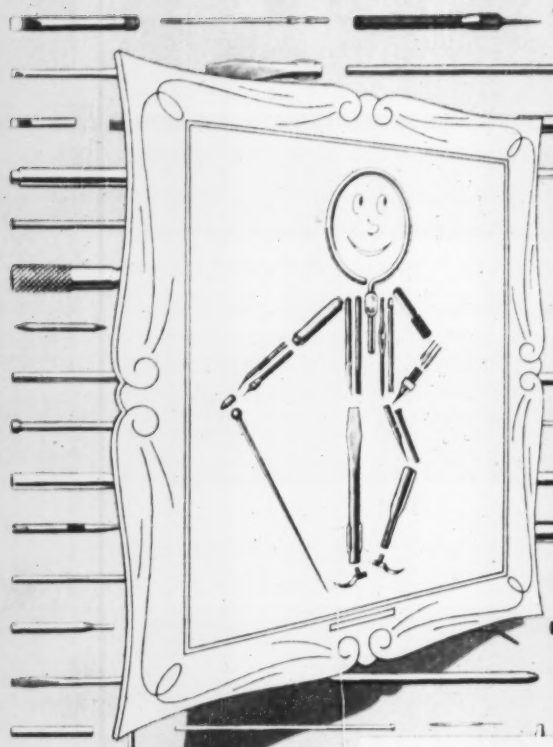
CRANE WHEELS
Overhead, Gantry, Mono-rail, Ingot Car, Charging Machine.

STOKER PARTS
Feed Screws, Furnace Tools, Flanged Pipe, etc.

HEAVY HARDWARE
Complete Line Wire Rope Fittings and Cutters, Bar Benders and Cutters.

YOUR INQUIRY WILL PROMPTLY BRING DETAILED INFORMATION PERTAINING TO ANY OF THE ABOVE FARRELL-CHEEK PRODUCTS

SANDUSKY, OHIO



PORTRAIT OF PRECISION

We make a big thing out of small parts because we know that your product's performance depends on even its smallest and least expensive parts.

Automatic machinery of our own design, produces over 10 million pieces like these *each day* . . . to customers' exact specifications of dimension, concentricity, temper, hardness and finish . . . in *any* metal.

Almost 90 years of precision metal-working experience enables us to produce your small parts *faster, better, and for less* than you can make them yourself.

Our quotation costs you nothing – *may save you plenty!* Send us a sample part, a blueprint, or sketch and a letter outlining your requirements. We are sure that our terms will be welcome news. We will be glad to send you our Condensed Catalog showing many more parts we can produce for you.

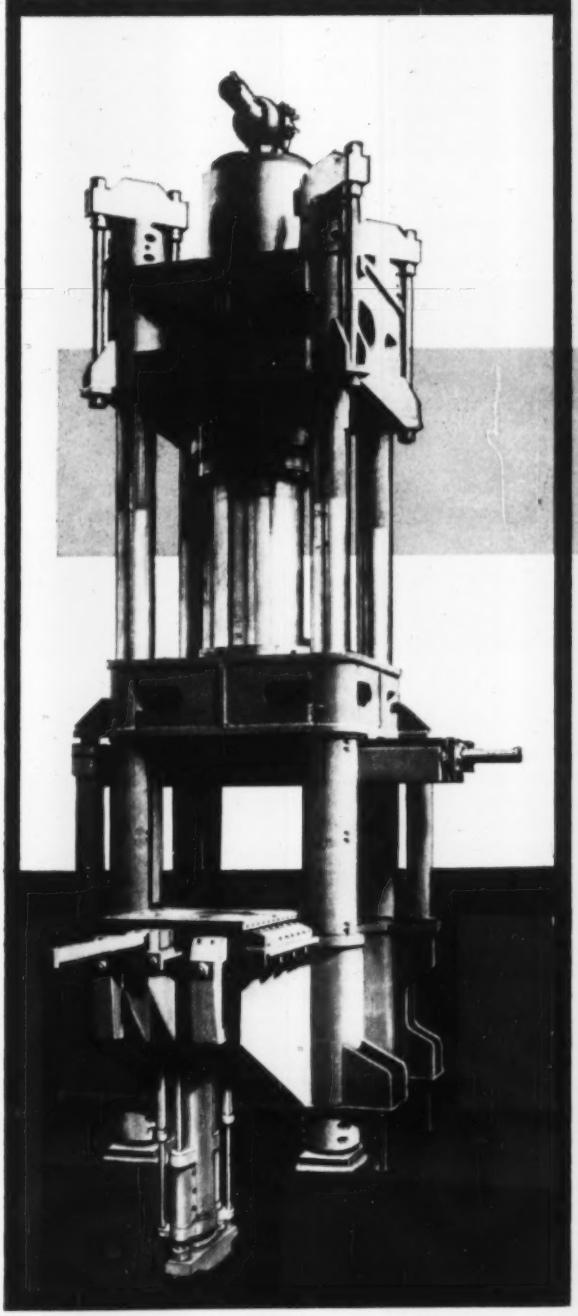
THE TORRINGTON COMPANY
Specialties Division
416 Field Street, Torrington, Conn.

TORRINGTON *SPECIAL* **METAL PARTS**

Makers of Torrington Needle Bearings

LOEWY—HYDROPRESS

FIRST



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FOR HIGH OUTPUT AND ECONOMICAL OPERATION

2,500 ton fast-working Hydraulic Long-Stroke Punching and Upsetting Press.
Part of a Loewy-Hydropress-built Forge Shop installation of special design.
Installed at the Green River Steel Corporation, Owensboro, Kentucky, the first plant to commercially produce sound ingots made by the Dornin Process.

WE BUILD

- Hydraulic Presses and Power Systems for the Steel and Non-Ferrous Industries.
- Open and Closed Die Forging Plants.
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- High-Pressure Pipe Testing and Expanding Machines.

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NEW YORK HERALD TRIBUNE, MONDAY, AUGUST 24, 1953

Rebuilt Carrier Hornet Is Ready for Jet Age

By Jack Tait

The Navy aircraft carrier Hornet, toughened up to handle a brood of latest-type jet planes by twenty-seven months of exhaustive conversion at the New York Naval Shipyard, Brooklyn, will be recommissioned on Sept. 11, 178 years after the first Hornet, a sloop armed with ten nine-pounders, joined the then puny American navy.

Originally commissioned in 1943 and inactivated in September, 1946, the Hornet will be unveiled nexth month as a 1953 model which will cost the taxpayers one-third the price of a new carrier. Comdr. J. R. Newland, superintendent of the Hornet reconversion job, stood on the dock the other day and looked up at the Hornet and said, "she sure looks like a mess now, but we'll have her ready in fourteen working days."

"The Latest Thing Now"

"She's the latest thing in carriers now," Comdr. Newland said, "but Lord only knows how long she will stay that way. They keep coming up with new planes. They make the planes bigger and faster and heavier. Well, all we can do is to try to keep up with them."

Almost ready. Workmen on the flight deck of the carrier Hornet are busy completing the twenty-seven-month job of bringing the ten-year-old ship up to date. The hero of Pacific battles in World War II was decommissioned in 1946. When she is recommissioned at the New York Naval Shipyard, Brooklyn, on Sept. 11, she'll be tough enough to handle modern jet aircraft.

If the Navy will rebuild a carrier, it's logical to—

Do the same with your machine tools

Today's tough-to-machine alloys, carbide tooling, tighter tolerances and higher speeds put your machine tools in the class of a 1940 aircraft carrier.

Take a tip from the Navy. They saved time and the taxpayer's money by rebuilding the *Hornet* to jet age standards. If it can be done with a carrier, it can be done with your machine tools, no matter how large. You can save time and your stockholders' money by rebuilding your machine tools for today's tougher work.

Savings: 50% or more of the cost of a new tool. Delivery time: a matter of weeks.

Make a comprehensive study of your machine tools and their production records. Those that aren't performing as well as they should ought to be rebuilt. Draw up a list of these machines and send it to Simmons. We will promptly reply and, if necessary, send an engineer to make an on-the-spot study of the tools to be rebuilt. Quotations made on fixed price or hourly basis—whichever is the more appropriate.

And remember—all machine tools rebuilt by Simmons are unconditionally guaranteed. Write or phone today.

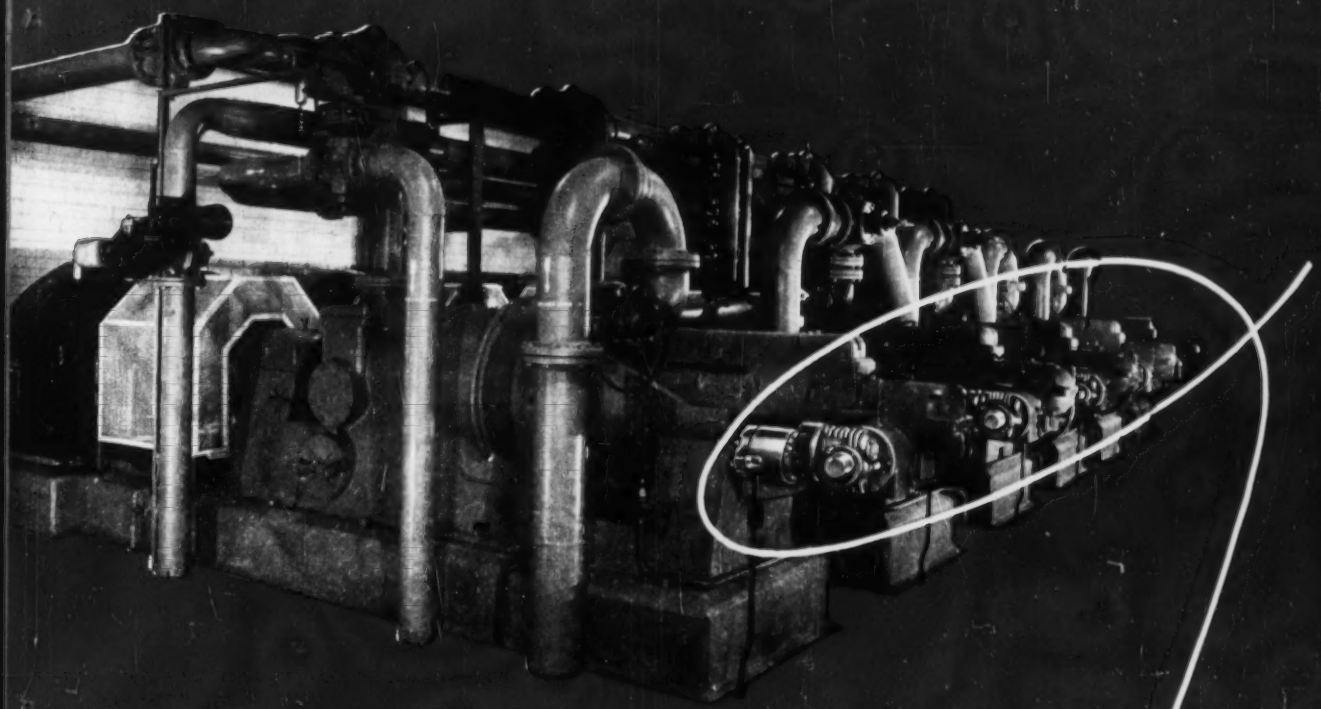
SIMMONS MACHINE TOOL CORPORATION
1755 North Broadway, Albany 1, New York
New York Office: 50 East 42nd Street

Engineered Rebuilding: a step-by-step process guaranteed to restore your machine tools to peak efficiency.*

- Machine tool completely dismantled — stripped down to bare castings and thoroughly cleaned.
- Machine is carefully studied to determine what must be done. Original manufacturer's specifications used as guide.
- All sliding surfaces checked for wear and refinished or replaced. (Ways, for example, can be replaced with new hardened steel ways, ground and hand-finished.)
- All bearings inspected and tested, replaced with new in slightest case of doubt.
- Modernized features added, as required.
- When replacements for worn parts cannot be purchased, we design, machine and heat treat with our own equipment.
- Entire unit is repainted and assembled.
- Machine tool is tested and inspected under actual operating conditions and shipped only if it meets performance standards set by original manufacturer.

* ...*or modernize them for greater speed and capacity if you wish.*

SIMMONS
ENGINEERED
Rebuilding
GIVES MACHINE TOOLS A NEW LEASE ON LIFE



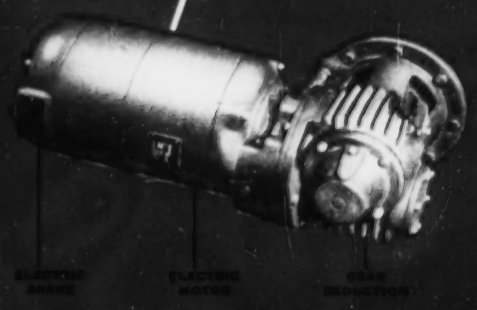
When you must have slow speed power, always consider first MASTER Right Angle Shaft Gearmotors. They're very compact . . . low in cost . . . safe . . . and so easy to use.

And nowhere else can you get anywhere near the wide range of selection that you have in MASTER Right Angle Gearmotors. They're available in sizes ⅛ to 25 Horsepower for all electrical specifications and in splash-proof, enclosed or explosion-proof construction. Gear reduction ranges up to 430 to 1 with the countershaft in either horizontal or vertical positions. In addition these gearmotors can be supplied with integrally built electric brakes . . . three types of variable speed units . . . and with fluid drive units for cushioned power.

Try them . . . you'll find they're the horsesense way to get slow-speed horsepower.

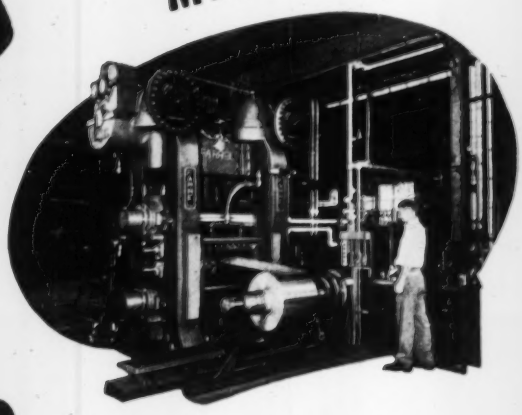
THE MASTER ELECTRIC COMPANY
DAYTON 1, OHIO

you can't beat them for compact slo-speed power

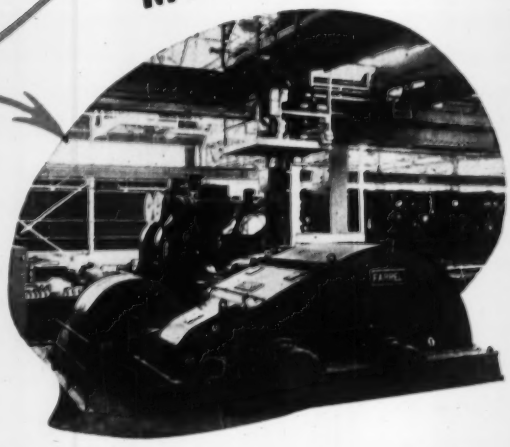


CALL FARREL® FOR

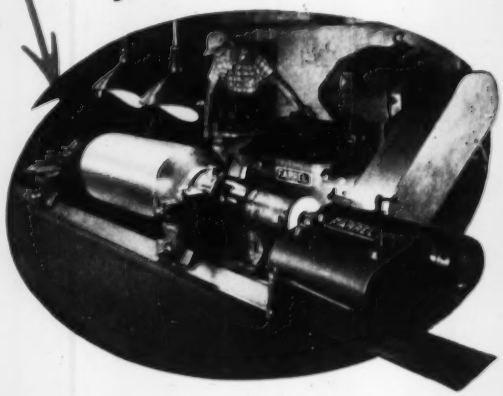
MILLS



MILL DRIVES



ROLL GRINDERS



Pick up the phone . . . to take advantage of close to a century of experience in supplying rolling mill equipment for the solution of specific production problems.

FARREL MILLS are built in a wide range of sizes for rolling nonferrous rods, strips or sheets, metal foils and cold strip steel. Farrel also designs and manufactures coilers and special handling equipment required to make each installation a complete production unit.

FARREL MILL DRIVES, PINION STANDS AND COMBINATION UNITS are specially designed to suit individual requirements. Single, double and multiple reduction gear units are available in a wide range of ratios and capacities. Pinion stands with single or double helical pinions are built in any size, for any capacity. Combination units include reduction gear drive and pinion stand in a compact, integral housing.

FARREL ROLL GRINDERS are available in two types and nine standard sizes. These machines grind rolls with a perfect surface, free from marks of any kind, either straight, or with concave or convex contours of exact symmetry and accuracy.

Ask for descriptive bulletins. No cost or obligation.

FARREL-BIRMINGHAM COMPANY, INC.

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Plants: Ansonia and Derby, Conn., Buffalo, N. Y.

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ALLOY and STAINLESS STEELS

BILLETS • SLABS • HOT ROLLED AND COLD FINISHED BARS

Rotary Electric Steel Co.

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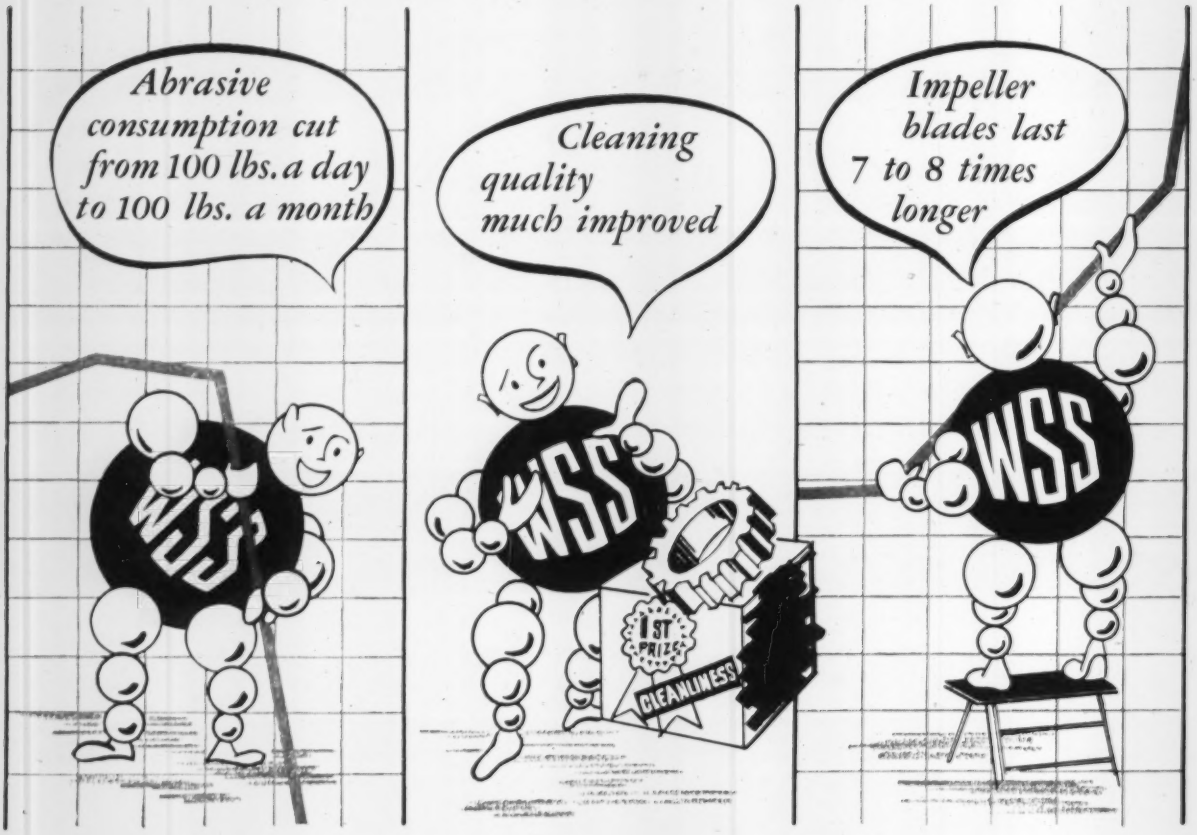
Complete facilities for annealing and heat treating

Rotary offers quality . . . now more than ever before, with newly expanded and improved manufacturing facilities. But what is more important, ROTARY OFFERS SERVICE.

A personal type of service that considers deadlines all-important and sees to it that deliveries are made on time . . . a service that is flexible enough to speed-up production schedules in order to meet specific customer needs. A service you can rely on.

pioneering developments keep WHEELABRATOR STEEL SHOT *first in abrasives*



triple savings result from use of WHEELABRATOR STEEL SHOT

at the FATE-ROOT-HEATH COMPANY

Thirty times longer shot life, 8 times longer life for blast machine parts and much improved cleaning quality have resulted at the Fate-Root-Heath Company since they switched to Wheelabrator Steel Shot. Whereas they formerly added 100 to 200 pounds of chilled iron shot every *day* to the machine . . . they now add about 100 pounds a *month* of Wheelabrator Steel Shot.

In addition, wheel blades now last 4 to 5 weeks compared to only 3 days with the chilled shot.

The Wheelabrator Tumblast in which this superior shot is being used is operated 7 hours a day, five days a week cleaning gray iron castings weighing from ¼ lb. to 300 lbs. each.

Not only does the Wheelabrator Steel Shot last longer and reduce operating costs, it also does a much better job of cleaning. No castings are cleaned more than five minutes and most are cleaned in a three minute cycle.

"If steel shot cost twice as much as it does, it would still be the cheapest material to use," writes W. L. Chatfield, Foundry Supt.

Similar performance records in plants throughout the country on every type of product prove convincingly that the lowest overall cleaning costs are achieved with Wheelabrator Steel Shot.

Try it today and see.

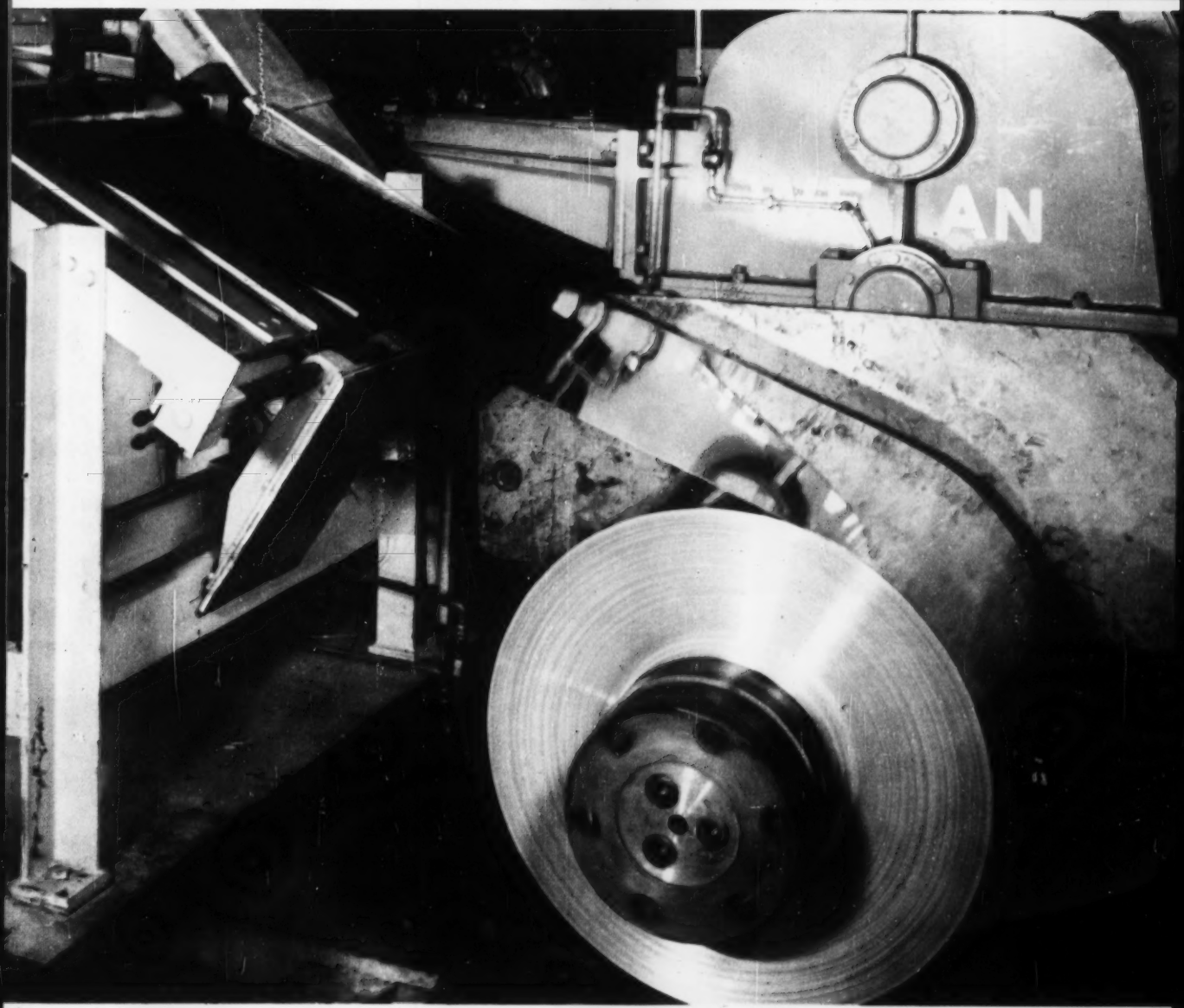
"6 Steps to Greater Abrasive Savings"—a new 8-page Bulletin describes how your abrasive costs can be cut. Send for your copy today.

American
WHEELABRATOR & EQUIPMENT CORP.

Wheelabrator STEEL SHOT

509 S. Byrkit St., Mishawaka, Indiana

The Wean Engineering Company, Inc., Warren, Ohio is a recognized specialist in the design and installation of sheet, tin and strip mill equipment. The expert knowledge and trained imagination of one of the world's most noted steel mill engineering firms are at your service when you specify Wean — whether the job calls for a single piece of equipment or a complete design of an entire line.

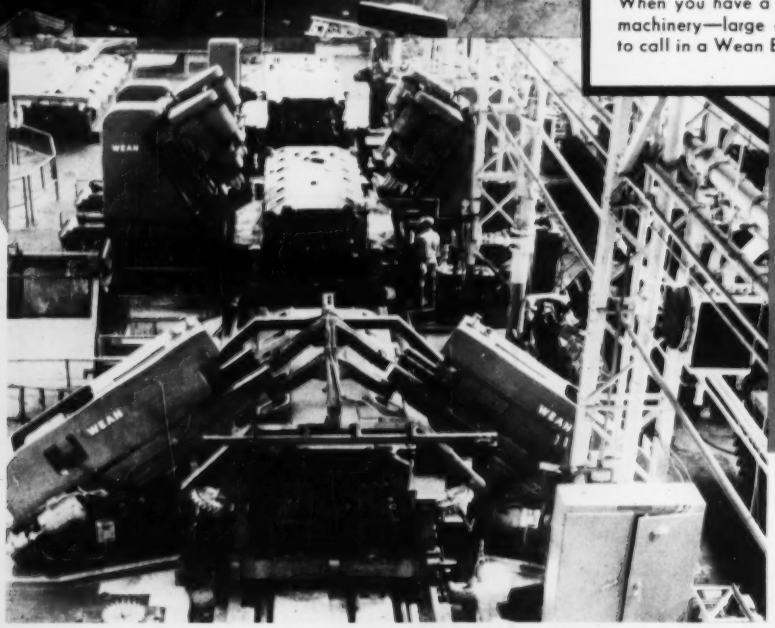


Exit end of high speed tinning line.

The WEAN ENGINEERING COMPANY, Inc.
WARREN OHIO

DESIGNING AND BUILDING TOMORROW'S METAL WORKING

SPECIAL METAL WORKING EQUIPMENT...



Solving the tougher problems for the metals working industry has become habit with the Wean Equipment Corporation. From a simple slitting line to the complete design and construction of a military vehicle processing line Wean Equipment engineers have yet to leave a problem unsolved. On this page are examples of recent Wean jobs for the military. The top photograph shows two giant machines designed to perform precision grinding and drilling on the armor plate of tank hulls. The machines turned a slow, hand process into a production operation that completes the job 22 times faster. The bottom photograph is of a unique trans-car line that performs precision milling, drilling and boring operations on heavy vehicle hulls . . . at the same time solving the handling problem of these bulky pieces.

When you have a job that requires special machinery—large or small—you'll be wise to call in a Wean Equipment engineer.

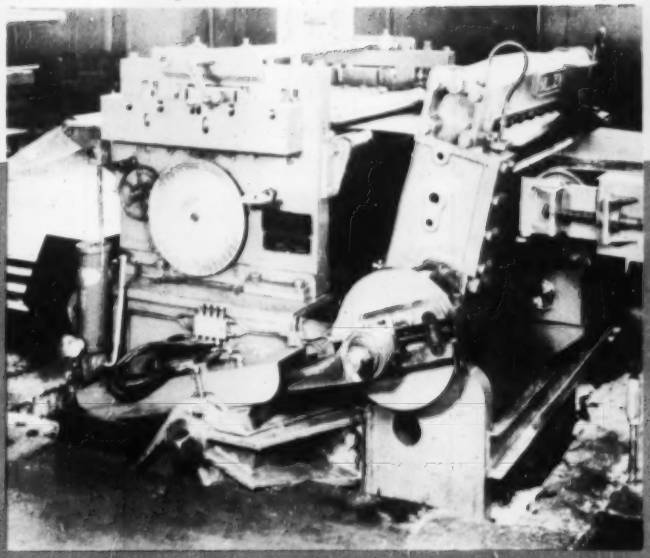
MACHINERY TODAY IS THE BUSINESS OF THE

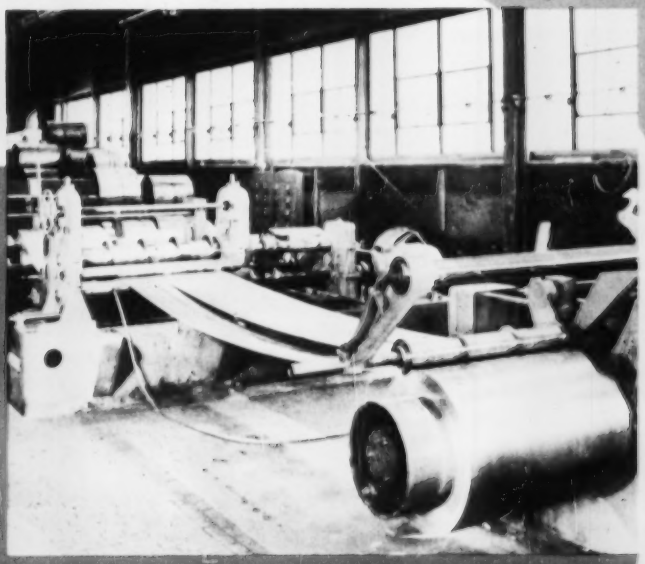
EQUIPMENT CORPORATION

Wean

Cleveland, Ohio

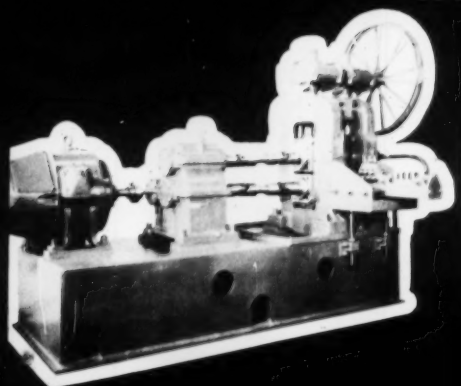
WEAN ADVANCED SLITTING and FLYING SHEAR LINE...

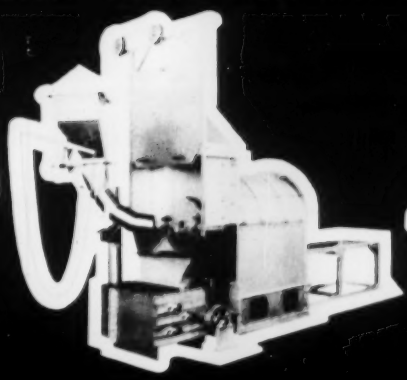


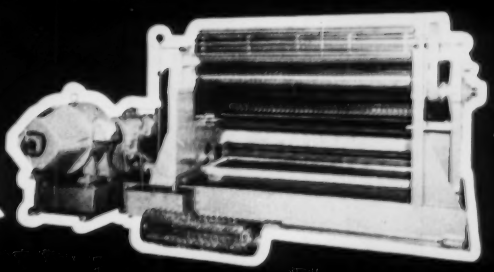


Here's the most advanced flying shear line marketed today. A line that can save you up to 20 per cent on your steel costs because it can make 100 cuts-per-minute to resquared tolerances. If you are a user of sheet steel it will more than pay you to get in touch with a Wean Equipment engineer and have him prove to you how you can order your steel direct from the mill, in coil form, eliminate expensive extras, and make a saving amounting to almost $20 per ton in your final steel costs. You can't afford to overlook this amazing new line . . . get in touch with Wean Equipment in Cleveland, Chicago or Detroit.

WEAN WIRE MACHINERY







Wean Equipment has for years been the major producer of wire machinery, and has the "know-how" to design and build machines to speed wire production and processing all along the line. If you make wire or wire products you should know the Wean Equipment man in your area. Products pictured here are typical of Wean wire machinery; a 2-hi wire flattening mill, a nail galvanizing unit, and a hexagon netting machine that holds all records for the manufacture of this popular wire product.

Wean high speed electrolytic cleaning line.

WEAN
ENGINEERING
Company, Inc.
WARREN, OHIO

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The McKay Machine Company.....Youngstown, Ohio
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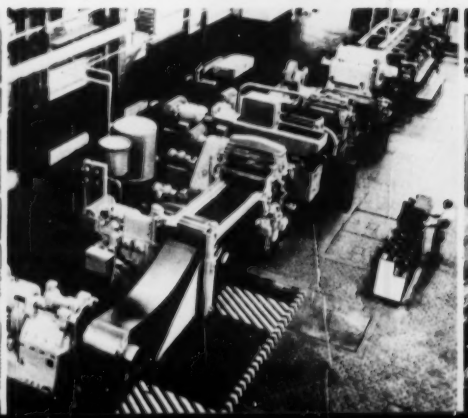
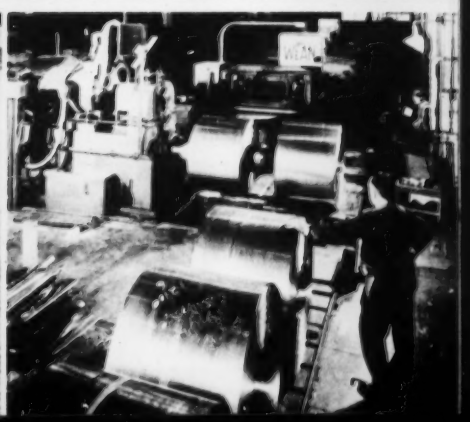
Continuous strip pickle line

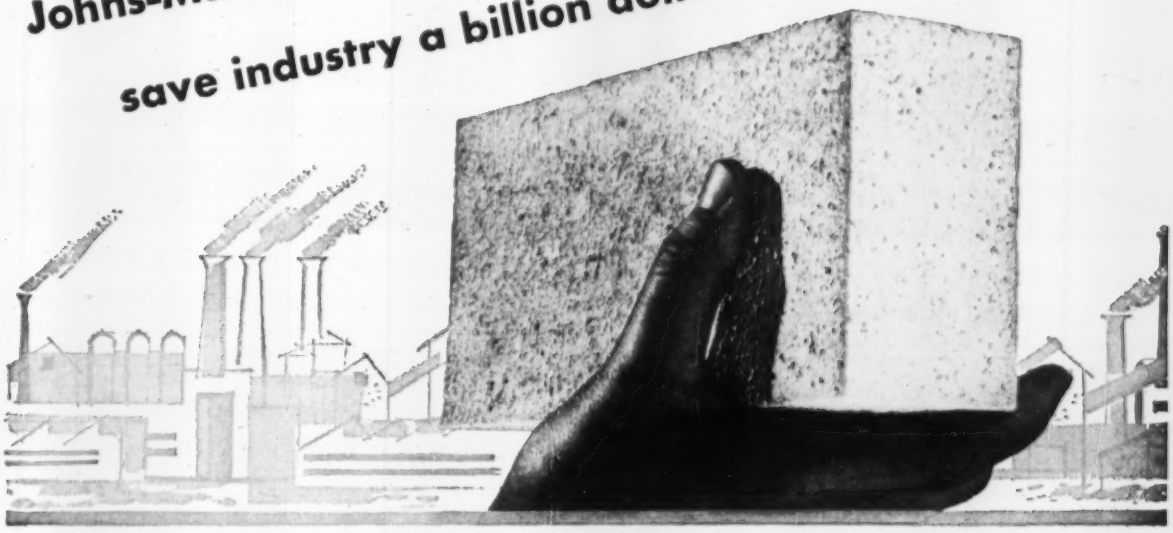
Continuous coating line



Continuous electrolytic cleaning line



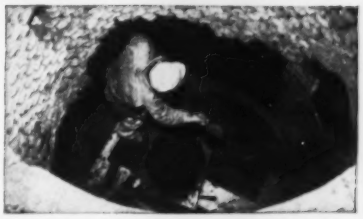
Johns-Manville Insulations save industry a billion dollars in fuel every year!



Reduce your fuel costs and build better furnace linings with JM-3000 INSULATING FIRE BRICK

HERE'S THE ONLY insulating fire brick that withstands a full 3000F. It's highly efficient both as an exposed refractory lining or as back-up insulation. And JM-3000 is only one of six types of Johns-Manville Insulating Fire Brick made for these applications. All provide long-life insulation. All are light in weight, have low conductivity, high structural strength. These properties permit thinner furnace walls—yet you can achieve important fuel savings and increased production, because J-M Insulating Fire Brick assures quick furnace response.

Sil-O-Cel* Insulating Brick is another outstanding J-M fuel-saver . . . a high load-bearing brick for back-up insulation behind refractory linings. It comes in three types, for service through 2500F—makes it possible to reduce the necessary thickness of refractory linings as much as one-third.



Save fuel with J-M Hydraulic Setting Refractories

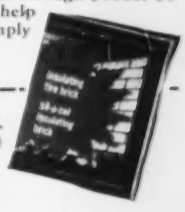
Johns-Manville refractories meet every need for castable, troweling and gunning applications for temperatures through 3000F. *Firecrete** is used to cast special shapes of all kinds. It is ready for use within 24 hours, has negligible shrinkage and high resistance to spalling. *Blazecrete** is used to build and repair furnace linings. When gunned, it adheres readily with a minimum of rebound loss. When slap-troweled, it eliminates laborious ramming and tamping.

Save Fuel with J-M Aggregates and Fills

These lightweight insulations are used as fills to conserve heat in irregular spaces where other forms of insulations cannot be economically applied. They are also used as aggregates for mixing with other materials to form insulating refractory concrete.

*Reg. U. S. Pat. Off

Send for your free copy! This new booklet IN-115A gives full details about J-M insulating materials for service through 3000F. To find out how they can help cut your fuel costs, simply mail coupon.



JOHNS MANVILLE JM PRODUCTS

Johns-Manville FIRST IN INSULATION

Johns-Manville, Box 60, N.Y. 16, N.Y.
(In Canada, 199 Bay St., Toronto 1, Ont.)
Please send me, without charge, copy of brochure IN-115A

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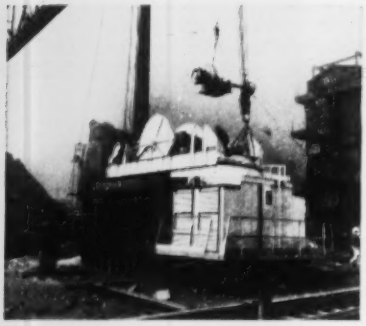
NEW DRAVO LIGHT-WEIGHT MAN TROLLEY INSTALLATION BROUGHT THESE RESULTS AT PITTSBURGH COKE & CHEMICAL . . .

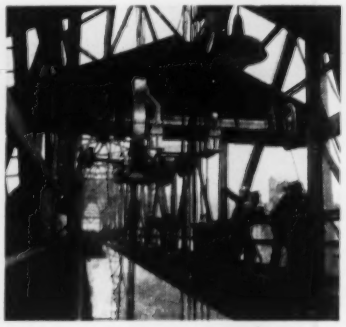
	NEW TROLLEY	OLD TROLLEY
Bucket Ore Load	8½ tons	5 tons
Operating Cycle	50 seconds	60 seconds
Free-digging Tonnage	600 tons/hr.	300 tons/hr.

Early in 1952, engineers at Pittsburgh Coke & Chemical Company foresaw a materials-handling problem which would arise when a new blast furnace was added to the plant's facilities. The existing materials-handling bridge would be unable to keep up with expanded operations when the new furnace began functioning. Dravo engineers were called in to discuss the problem.

The result was a decision to install a new Dravo light-weight man trolley which would permit using a larger bucket. This increased the bridge's capacity at ⅛ the cost of a new bridge. Installation time was only 13 hours. Here is how it was done.



1 Designed and constructed by Dravo Corporation, the new man trolley was blocked on cribbing below the bridge. Each axle was lifted 75 ft. to the trolley runway.



2 Both axles were left suspended above the runway until the trolley frame with its attached machinery house and operator's cab was hoisted, placed on runway rails and supported with the trolley jacking lugs.

3 The trolley frame was hoisted into place by steam-driven block-and-tackle. The trolley's all-welded construction with liberal amounts of aluminum used in the machinery house and operators' cab greatly reduced its weight.

4 It took only 13 hours to install the new trolley and remove the old one. With the short time the bridge was out of service, production of the two blast furnaces at the plant was not interrupted.

The installation of a Dravo light-weight man trolley on existing materials handling structures still in good structural condition is the practical way to increase the capacity of ore and coal bridges to meet growing production requirements.

The weight saving factors of the new trolley are utilized in a larger capacity bucket without increasing the over-all load on the bridge. Some of the weight-saving factors include: All-welded frame of corrosion-resistant alloy steel, an aluminum sheathed machinery house and operator's cab, heat treated axles and the use of high-strength alloy components elsewhere.

A new Dravo light-weight man trolley can step up your bridge performance. If you have a materials-handling problem, we will be glad to discuss it with you and suggest a logical solution.

DRAVO

CORPORATION

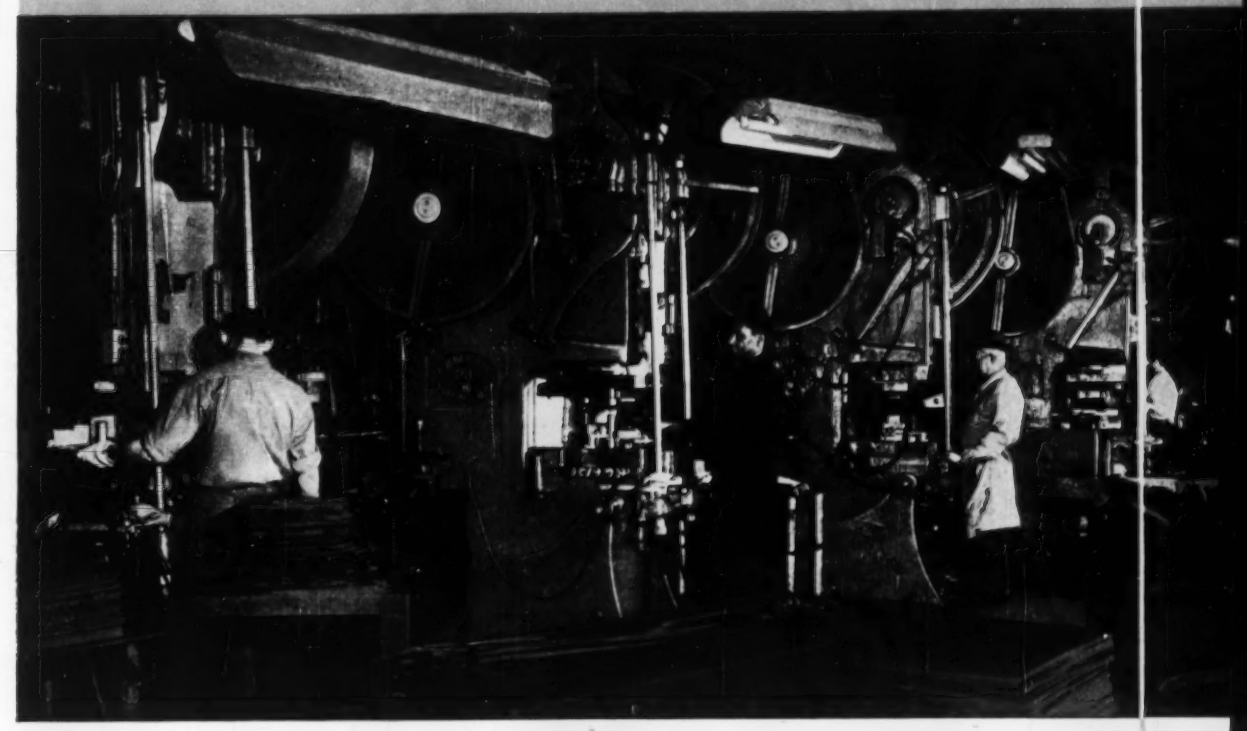
NEVILLE ISLAND, PITTSBURGH 25, PENNA.

DESIGNERS and BUILDERS

Bridges and Unloaders • Tower-type Unloaders
Whirler Cranes • Floating Cranes
Dravo Rail Clamps • Barge Shifters
Modernized Trolleys for Existing Bridges

At Art Steel Company, too,

BLISS Presses Predominate



97% are Bliss-Built

Now, Art Steel Company, one of the leading manufacturers of steel office equipment — *Steelmaster* — credits Bliss with an important role in its progress. For Art Steel has looked to Bliss since 1923 for engineering counsel and the right press for each operation. Seventy-three Bliss presses making up 97% of Art Steel's press equipment attest to the fact that Bliss has justified this confidence.

Asked *why the continued preference for Bliss presses,* Art Steel officials sum it up in one word — "*dependability*".

And that's why hundreds of sheet metal plants throughout this country and abroad specify Bliss presses more than any others. Whether your requirements involve mechanical or hydraulic presses . . . high speed or normal speed . . . straight side or gap frame . . . it pays to call for a Bliss engineer. He can show you why Bliss belongs in *your* press room, too.

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U. S. Plants in Canton, Salem and Toledo, Ohio; and Hastings, Michigan. Branch offices in Chicago, Cleveland, Dayton, Detroit, Indianapolis, New Haven, New York, Philadelphia, Rochester, Toledo; and Toronto, Canada. West Coast Representatives: Moore Machinery Co., Los Angles and San Francisco; Star Machinery Company, Seattle. Other representatives throughout the world.

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BLISS on your press is more than a name . . . it's a guarantee!

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• These pages can only hint at the variety and scope of machines now being made available to you through Motch & Merryweather engineering. Each machine has been designed only because it performs a present operation better or unitizes operations to advantage. To further cost-saving and automation in your production program, call on Motch & Merryweather's 50-year background.

USE AN EXPERIENCE REACHING BACK 50 YEARS IN THE MANUFACTURE AND SALE OF MACHINE TOOLS

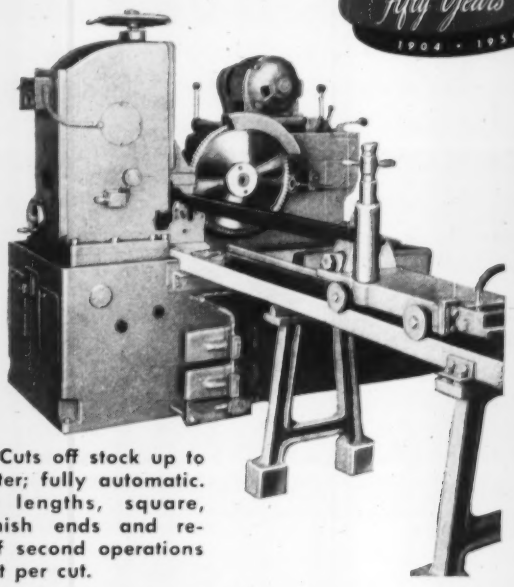
MOTCH & MERRYWEATHER Circular Sawing Machines

to cut off every size and shape of stock, ferrous or non-ferrous.

Fifty Years 1904 - 1954

Four other sizes for cutting off stock; blades up to 96" diameter.

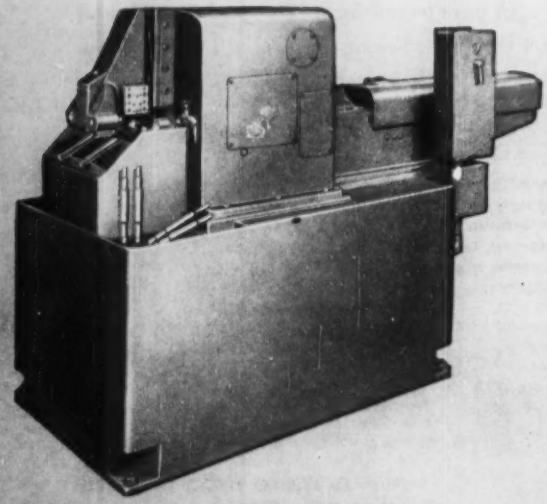
No. 00-G Automatic cuts off stock up to 3" diameter, straight or at angles up to 45°.



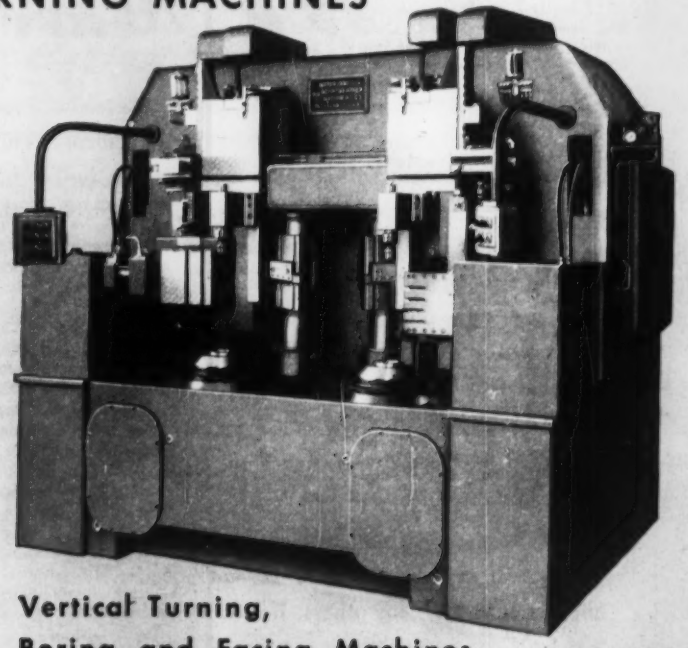
No. 2-A. Cuts off stock up to 6" diameter; fully automatic. Accurate lengths, square, milled finish ends and reduction of second operations lower cost per cut.

Motch & Merryweather TURNING MACHINES

Cam Automatic Forming Machines



Single- and double-spindle models. Hopper loading or bar feeds. All movements actuated by single cam shaft.

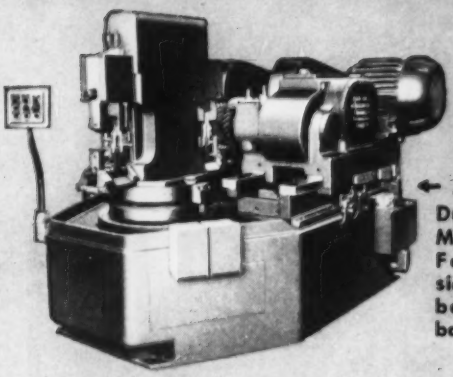


Vertical Turning, Boring and Facing Machines

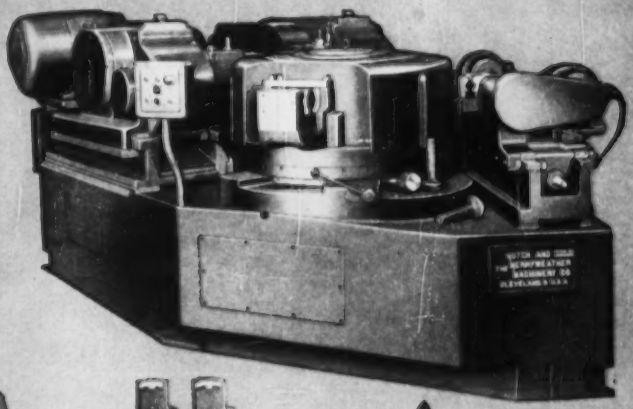
Single- or double-spindle. Multiple tool blocks hydraulically fed with automatic sequence for maximum metal removal.

FOR PROFITABLE PRODUCTION THROUGH DESIGN

Heavy Duty Production Milling Machines

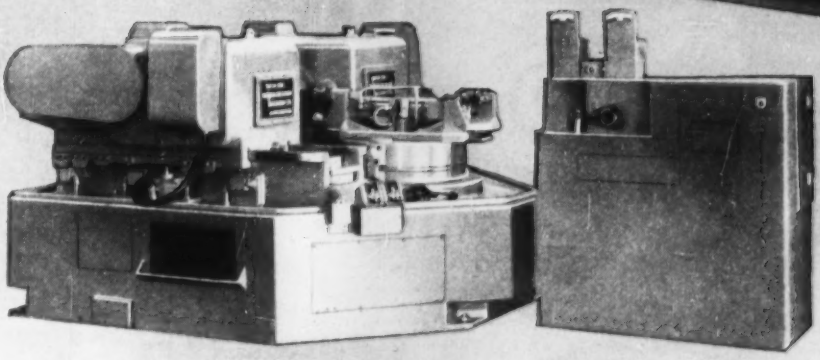


Duplex Production Milling Machine. Face mills both sides of tractor side bars. Up to 268 bars per hour.



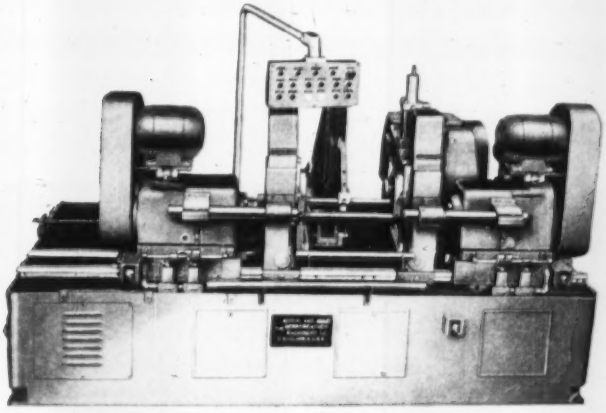
Milling and center drilling unitized. Face mills and center drills both ends of pinion shaft. Up to 230 shafts per hour.

Weight-balance milling machine unitizes weighing and subsequent metal removal. Face mills weight boss on each end of automotive connecting rod. Up to 300 pieces per hour.

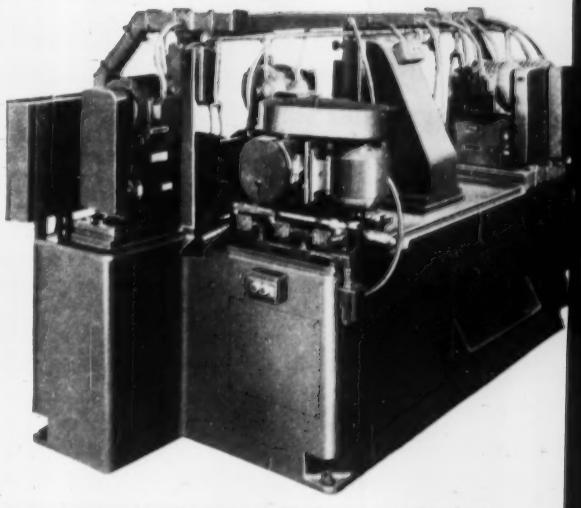


M. & M. TRANSFER MACHINES

for bar stock cut-off and double-end machining, tailored for individual requirements.



Cut-off operation simultaneous with double-end machining. Models for stock ½" through 6" diameter, lengths 8" through 40". Many forms and combinations of double-end machining.



Unusual combination of machining operations in one unit: drill, countersink, broach, cut-off, chamfer.

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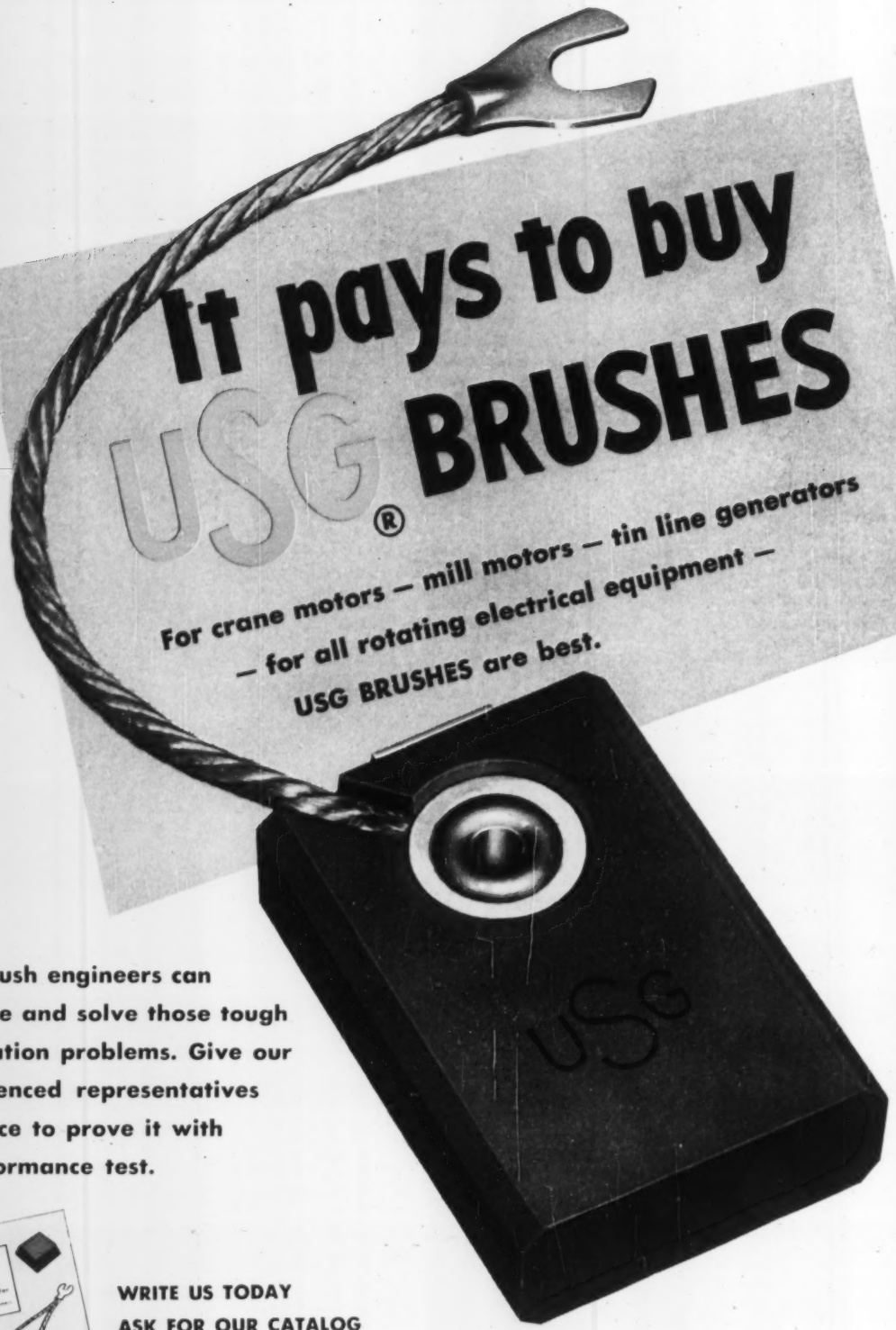

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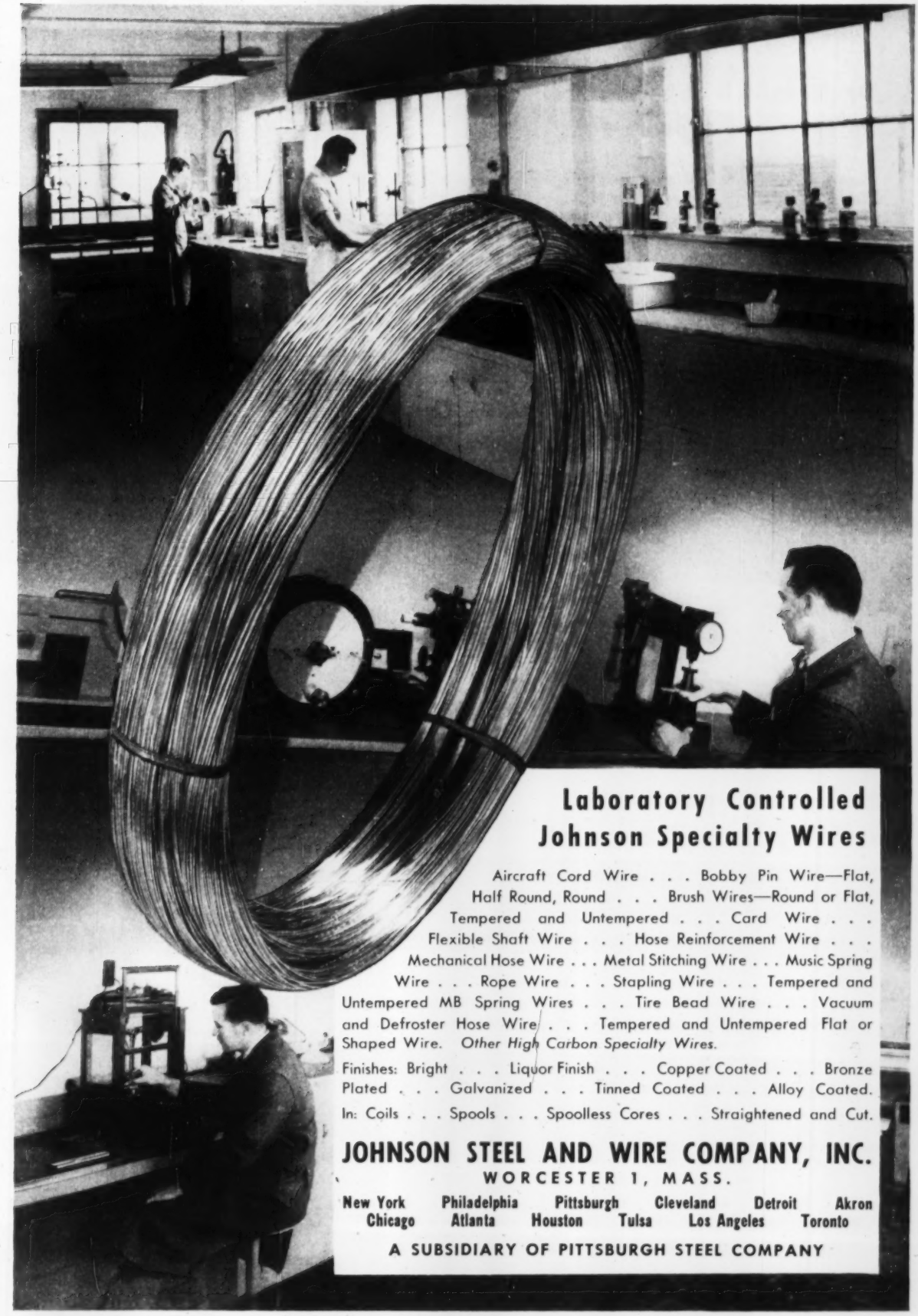

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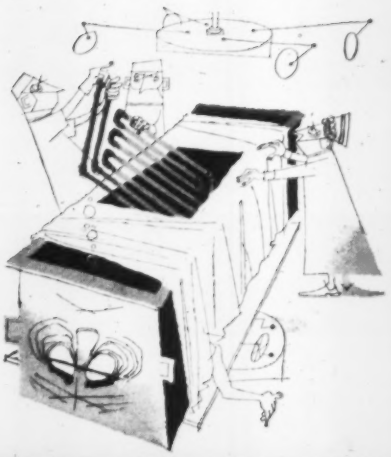
coil-itis cured — chipping eliminated*

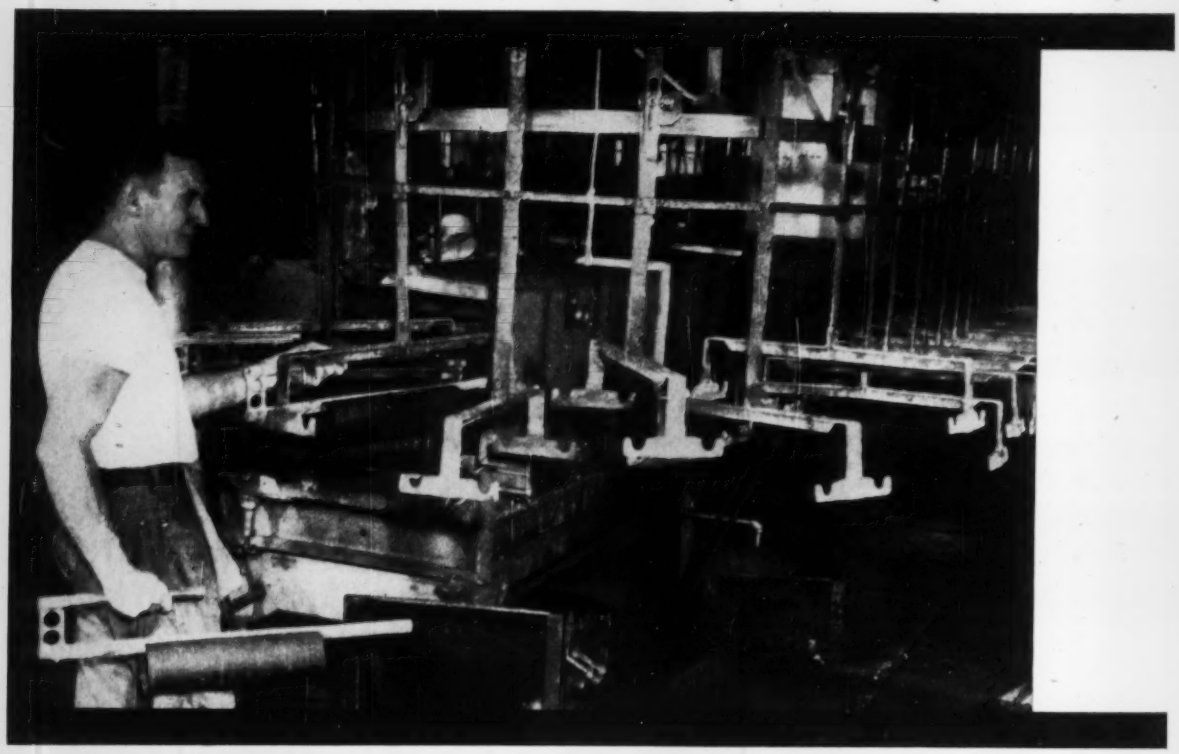
by PLATECOILS

to save 6 to 8 hours daily

Use of Stainless Steel Platecoils in a phosphate coating tank at Sealed Power Corporation has completely eliminated a 6 to 8 hour a day chipping job. The brass pipe coils formerly used became so coated with scale they had to be cleaned daily.

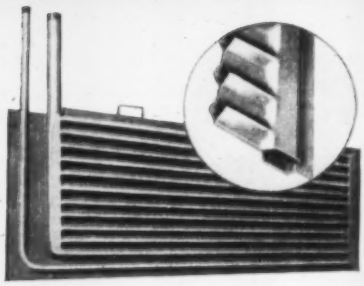
Three Platecoils heat this tank as efficiently as four pipe coils and maintain desired temperatures throughout both shifts. Scale removal, when necessary, takes less than two manhours compared to 10 hours for pipe coils.





PLATECOILS® *replace pipe coils for 50% of the cost*

* Coil-itis is the constant doctoring of wet processing tanks for pipe coil troubles. It can be cured easily by replacing pipe coils with Platecoils. Immediately, you will notice the difference at Platecoils put new life and profits into your heat transfer processes. They heat or cool 50% faster and take 50% less space in the tank. They save as much as 50% in initial cost and 50% in maintenance costs in addition to overcoming the limitations and operating difficulties of old fashioned and outmoded pipe coils.



Bulletin P72 shows how Platecoils are replacing pipe coils at a savings throughout industry. Send today for your copy.

Platecoil Division, TRANTER MANUFACTURING, inc., Lansing 4, Michigan

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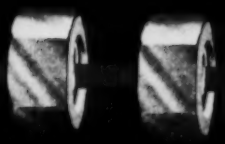

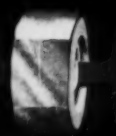

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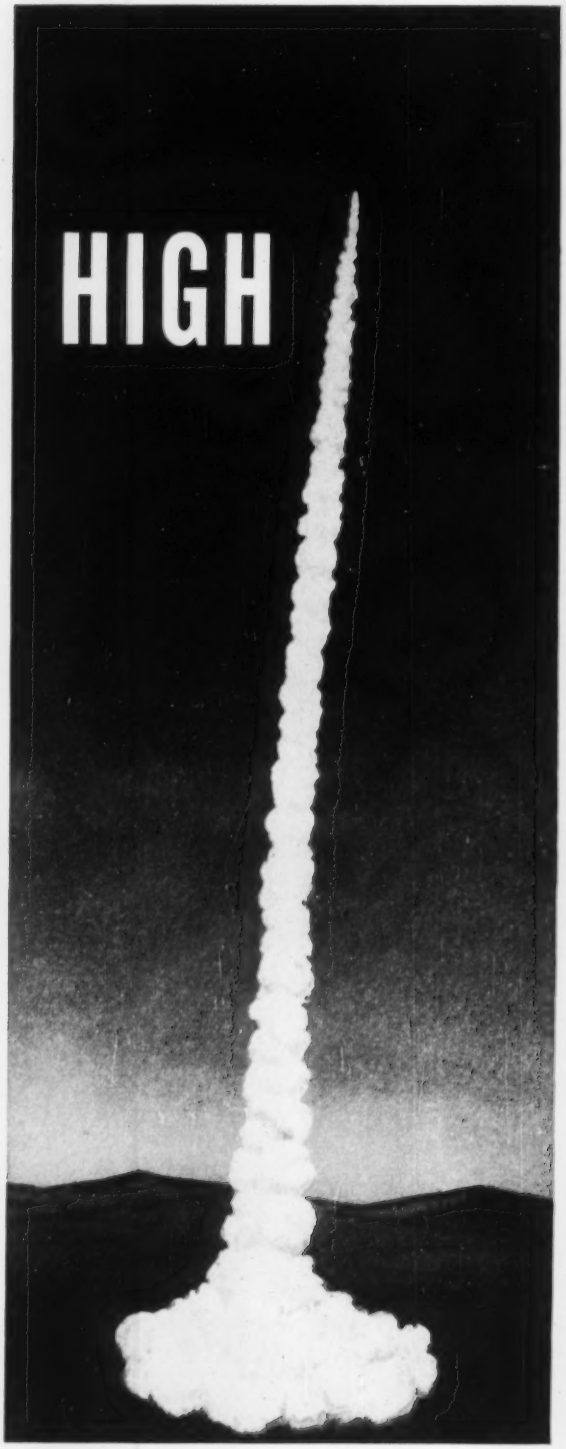

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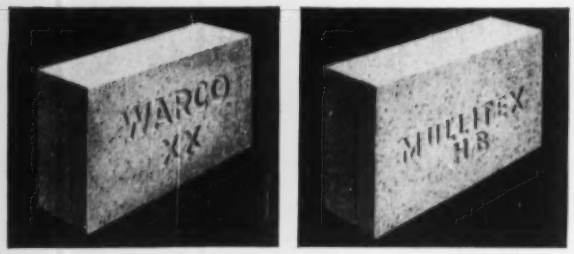
Continued mechanization and modernization in our plants has further improved production at Walsh to give you more of everything you need in Missouri-Quality Refractories. Helping you to meet today's demands for production at lower cost is an example of continuing progress at Walsh—for over 50 years manufacturers of high grade refractories.



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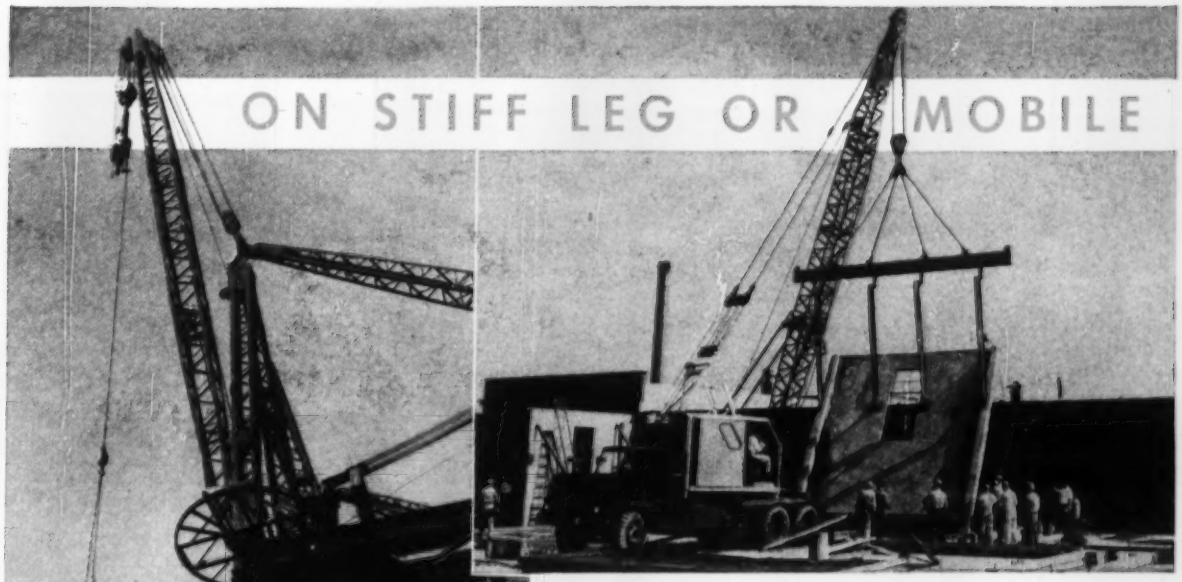

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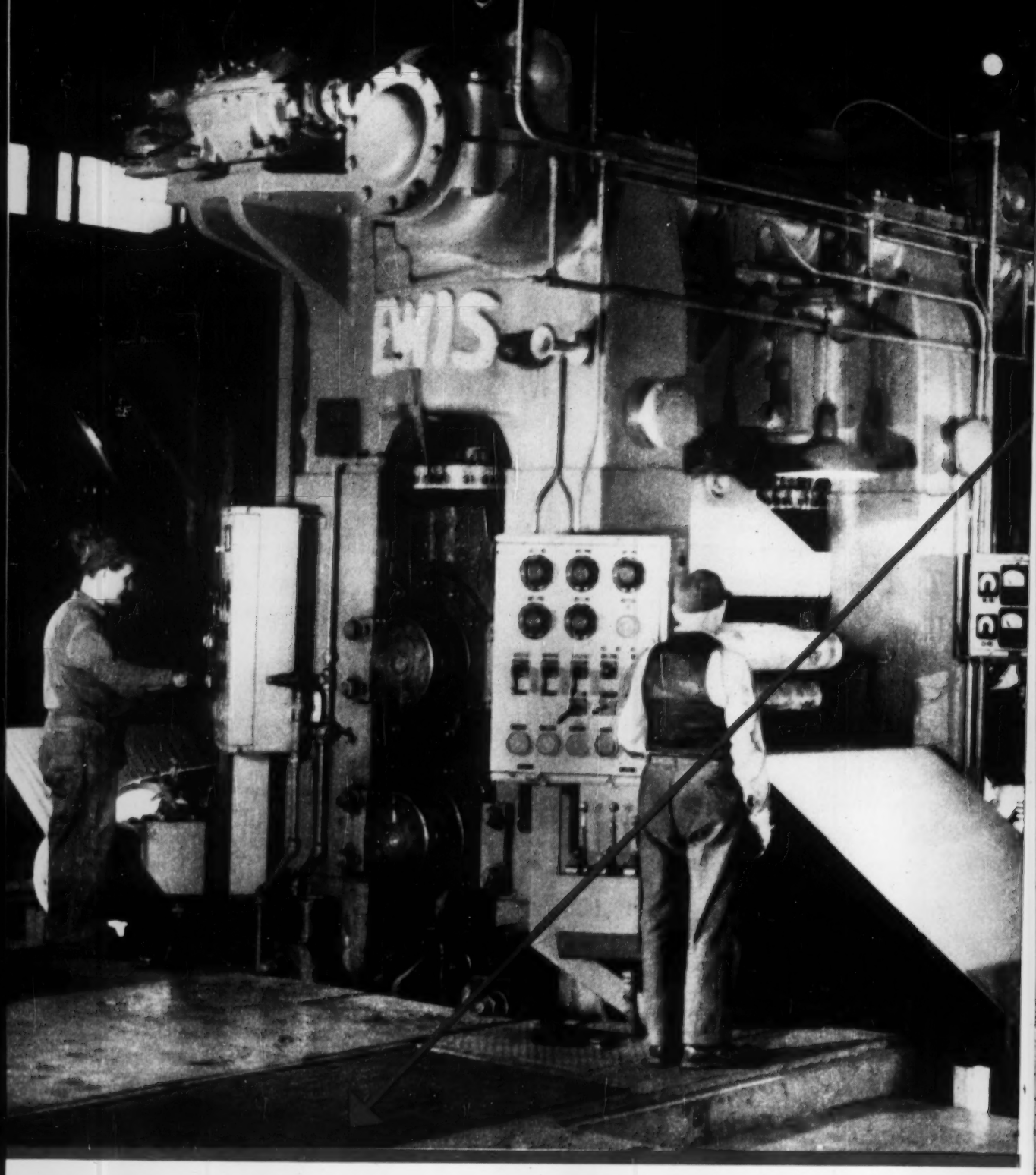

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. . . rolls out quality strip of uniform, accurate gauge and high lustre finish

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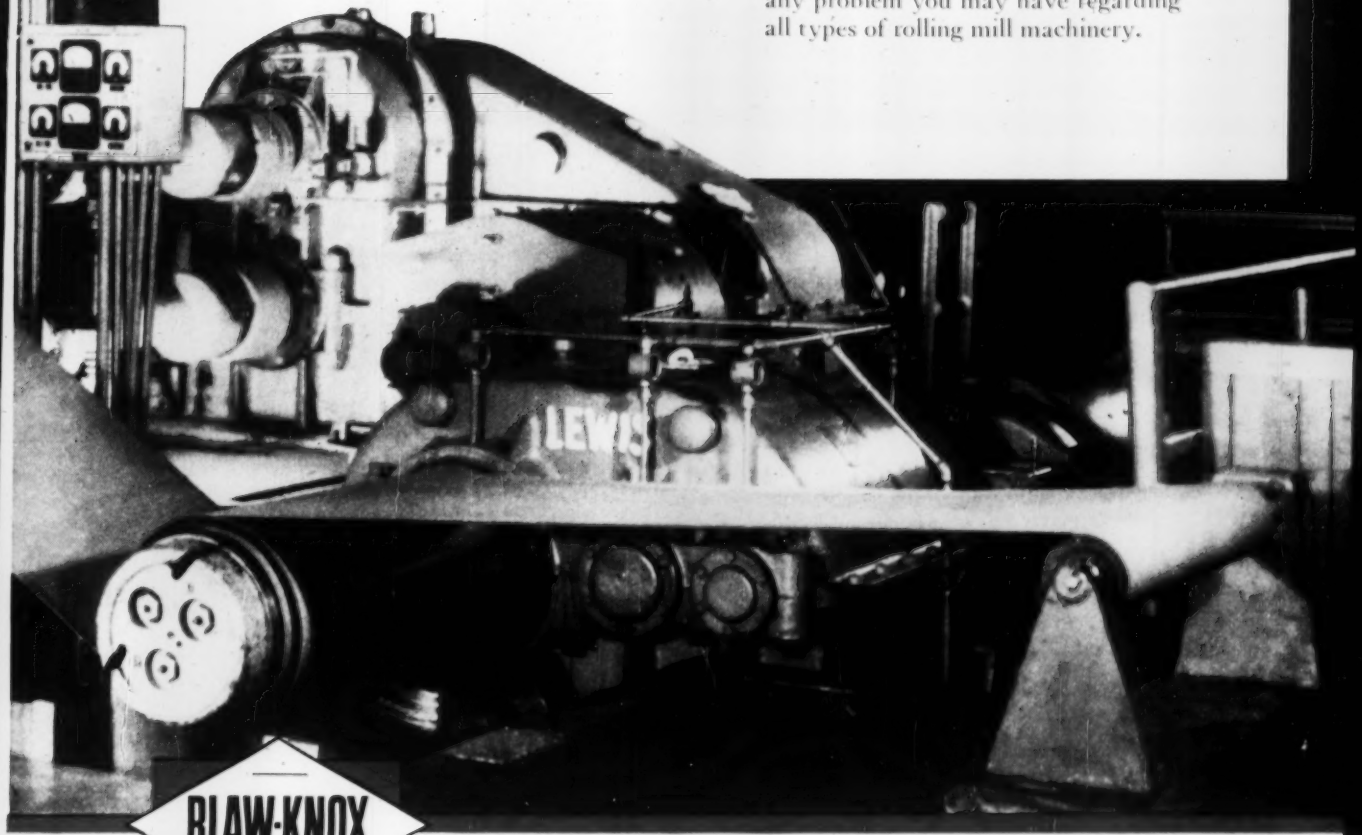
This new mill operates to very close tolerances, at speeds from 150 to 300 feet per minute on stainless steel. Already built and operating in 28″x42″ and 28″x56″ sizes. Other units, using the same basic design, can be built in sizes to handle the full range of widths and gauges—to meet your particular requirements.

At any time, we will be pleased to give you more complete information about the design and performance of this new Lewis two-high, skin pass Mill.

And, of course, our experienced engineers and our manufacturing facilities are always available to help you solve any problem you may have regarding all types of rolling mill machinery.



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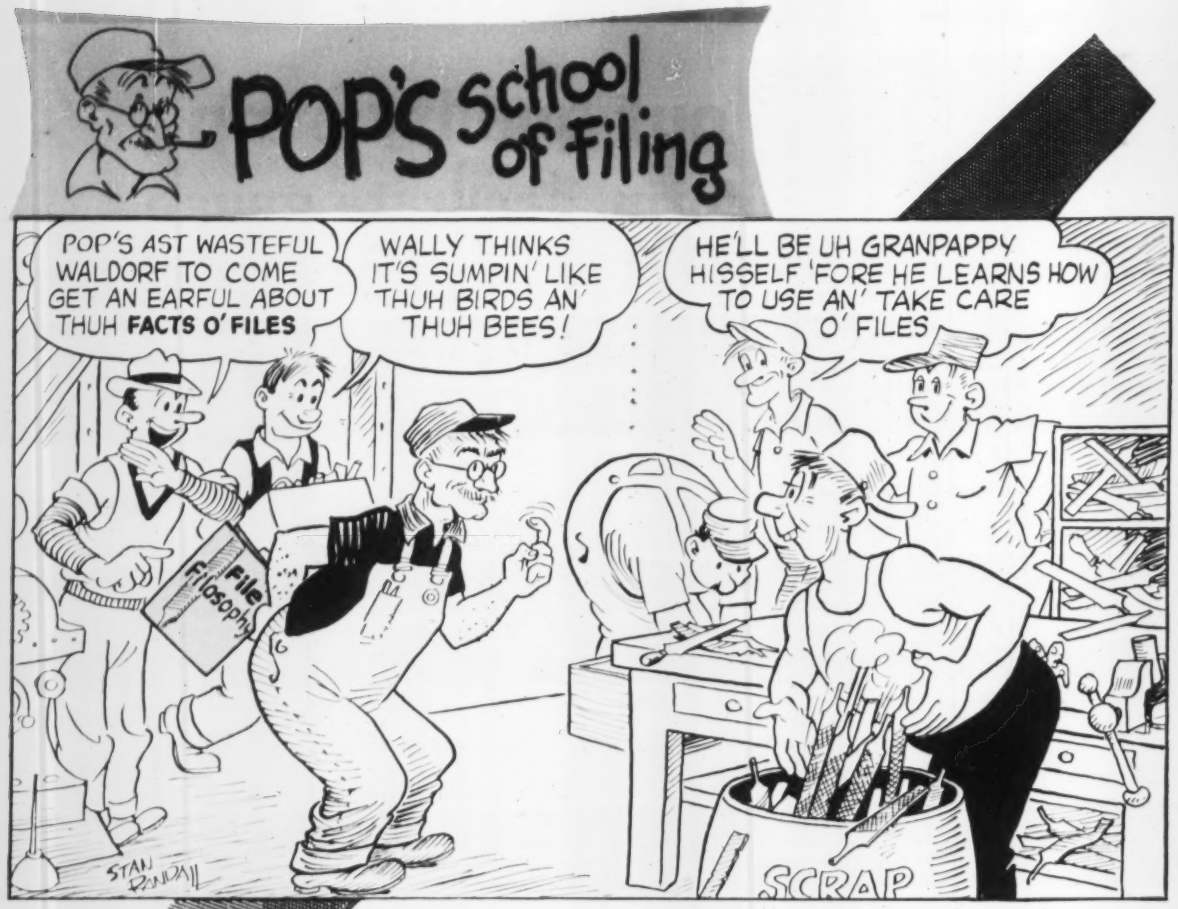

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Too many files go to an early grave (scrap barrel) because of incorrect use and lack of care. Nicholson—world's foremost file manufacturer—goes to extraordinary lengths to put extra quality and life into Nicholson and Black Diamond files in order to give industrial concerns an extra measure of filing production. Getting it is well worth keeping workers reminded of these simple rules:

DON'T put too much pressure on forward file stroke.

DON'T drag file back under needless pressure.

DON'T let files become clogged with dirt or filings.

DO "tap" file frequently (on wood) to loosen chips; also clean with file brush or "card."

DON'T throw files on top of one another. (Scuffs, blunts and chips teeth.)

DO keep files separated (in racks).

DON'T let files rust. (Corrodes and dulls teeth.)

DO use *The right file for the job.*

*CONSULT YOUR INDUSTRIAL DISTRIBUTOR. The variety of Nicholson and Black Diamond files is wide. Designs are frequently distinctive. The importance of careful selection is great. No other file manufacturer has gone more intimately into the solving of industrial filing problems—in relation to different metals, operations and shop practices. We, through Industrial Distributors and our own field services, will help you gladly.

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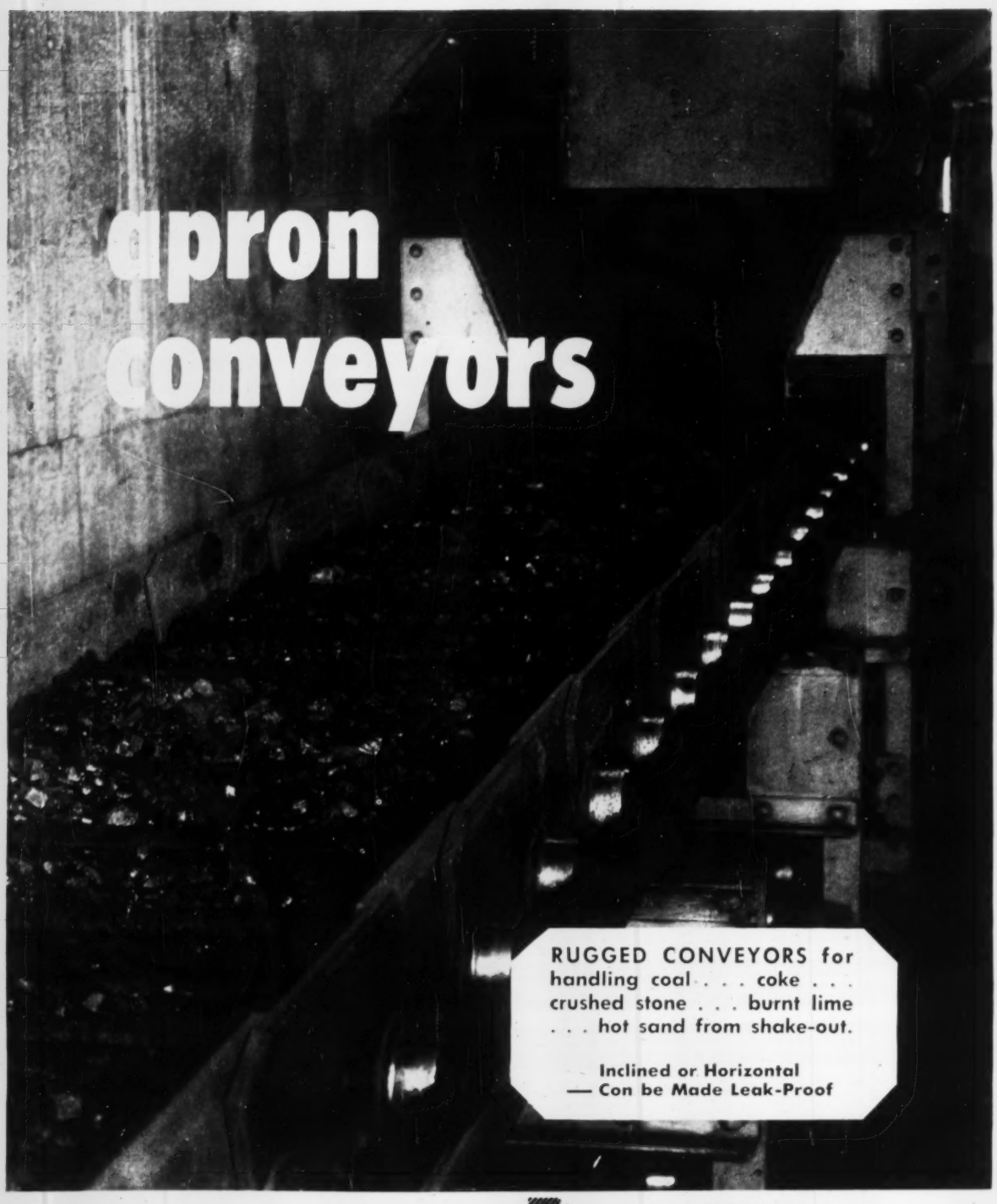

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OVER SIXTY YEARS OF SERVICE TO THE STEEL INDUSTRY

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now!... and

Copper Plated

Certified
BRAD FOOTE GEARS

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Certified BRAD FOOTE Gears are made to your order...from your specifications...or from specifications we develop for you. Every operation, from machining through heat treating, on every gear, gearmotor, reducer, or transmission is done in our own shops and carefully controlled by BRAD FOOTE engineers.

Testing of *Certified* BRAD FOOTE Gears is done with modern hardness testers, Magnaflux, Metallograph, Shadograph, and numerous micro-gauges. That's why we can say "*No one shares our responsibility.*"

Copper Plating

You get three distinct advantages from the copper plating* of *Certified* BRAD FOOTE Gears. The copper plating prevents corrosion. It eliminates messy, dirt-catching greases. It permits gears to be kept on hand indefinitely without ill-effects.

Another thing, the thin copper plating acts as a lapping compound which lets the gears run in smoothly and quickly. You do not have to remove it from teeth or bearing surfaces.

And, copper plating is your positive identification of *Certified* BRAD FOOTE gears. It's your guarantee of quality. It's your assurance that the gears you bought have long-wearing teeth and bearing areas, and tough cores that will give you service equal to or better than that of any other gears made.

Certificate

Furnished with every order of *Certified* BRAD FOOTE Gears and assemblies is a Certificate bearing our order number and signed by BRAD FOOTE'S Product Certification Manager. It certifies strict adherence to specifications and the formula applying to *Certified* BRAD FOOTE Gears. You can't buy better gears.... *Yet...you pay no more.*

Write today for descriptive literature

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BRAD FOOTE GEAR WORKS, INC.

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BIshop 2-1070 • OLympic 2-7700

subsidiaries

AMERICAN GEAR & MFG. CO. • Phone: Lemont 920 Lemont, Illinois

PITTSBURGH GEAR COMPANY Phone: SPaulding 1-4600 Pittsburgh 25, Pennsylvania

no increase in Price!

Certified®
BRAD FOOTE
PRODUCTS

Certificate

This is to certify that:

1. The products furnished on BRAD FOOTE order number 19345 readily identified by their corrosion-preventive copper plating,* were made according to an exclusive BRAD FOOTE formula which controlled every step in the manufacturing process.
2. Only the finest quality metal for the particular service in which the products will be placed was used.
3. All machining specifications, where necessary, were held to extremely close tolerances.
4. Heat-treating of ferrous metals was carefully controlled by skilled workers using modern equipment.
5. Original specifications were adhered to and every operation was rigidly inspected.
6. All hardness specifications of teeth, cores, bearing areas, etc., were accurately tested on modern Rockwell or Brinnell hardness testers.
7. All standards of the American Gear Manufacturers' Association (AGMA) were met or bettered.
8. These BRAD FOOTE *Certified* Products were made to give service that is equal to or better than you might receive from any other similar products in equal service.

*Products over 30" diameter are protected by copper colored water soluble paint which need not be removed before placing in service.
Plating and painting are not applicable to certain parts of assemblies.

Date January 2, 1954

BRAD FOOTE PRODUCTS

Signed _____ Manager
Product Certification

BRAD FOOTE GEAR WORKS, INC.
Cicero 50, Illinois

*Gears over 30" diameter are protected by copper-colored water-soluble paint which need not be removed before placing in service

FOR LONGER POUNDS OF SPRING STEEL . . . . *Try Sandvik*

SANDVIK ROLLS STRIP CLOSER TO EXACT SIZE . . . GIVES YOU MORE FEET AND MORE PARTS PER POUND

Sandvik precision-rolling not only produces strip within specified tolerances, but consistently brings gauge closer to the exact size. That means more parts for your spring steel dollar.

Sandvik's consistent uniform physical properties, coil after coil, lot to lot assure continuous, high quality production at a lower cost per part.

Sandvik Swedish specialty cold-rolled, high carbon strip steel is available:

- **Precision-rolled in thicknesses from .001"**
- **In straight carbon and alloy grades**
- **In special analyses for specific applications**
- **In more than 800 stock sizes**
- **Annealed, unannealed or hardened and tempered**
- **Polished bright, yellow or blue**
- **With square, round or dressed edges**

Phone, wire or write your nearest Sandvik office for further information or technical assistance.

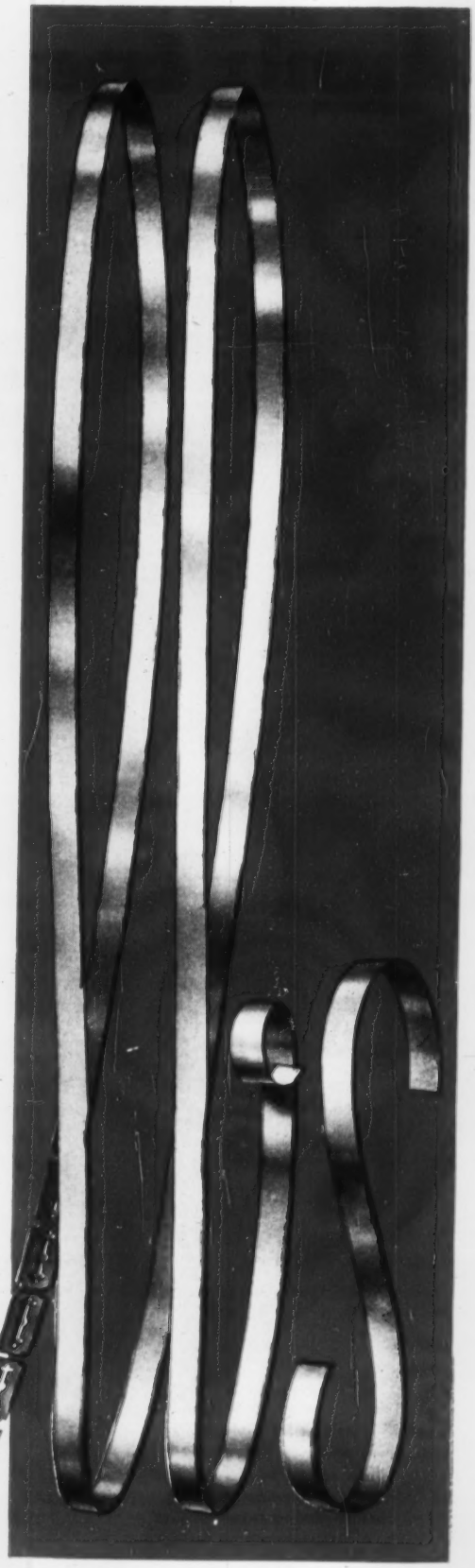
SOME SANDVIK SWEDISH SPECIALTY STRIP STEELS

Steel for Textile Machine Parts • Band Saw Steels; Metal Band, Wood Band and Butcher Band • Camera Shutter Steel • Clock and Watch Spring Steels • Compressor Valve Steel • Doctor Blade Steel • Feeler Gauge Steel • Knife Steels • Razor Blade Steel • Reed Steels • Shock Absorber Steel • Sinker Steel • Spring Steels • Trowel Steel • Vibrator Reed Steel, etc.

FREE!

SANDVIK CATALOG DESCRIBES 785 SPRING STEEL SIZES

If you buy or specify spring steel you should have this catalog. It gives thickness, width, hardness, types of edges, and weight in pounds per hundred feet. Also useful conversion tables. Write for your free copy.



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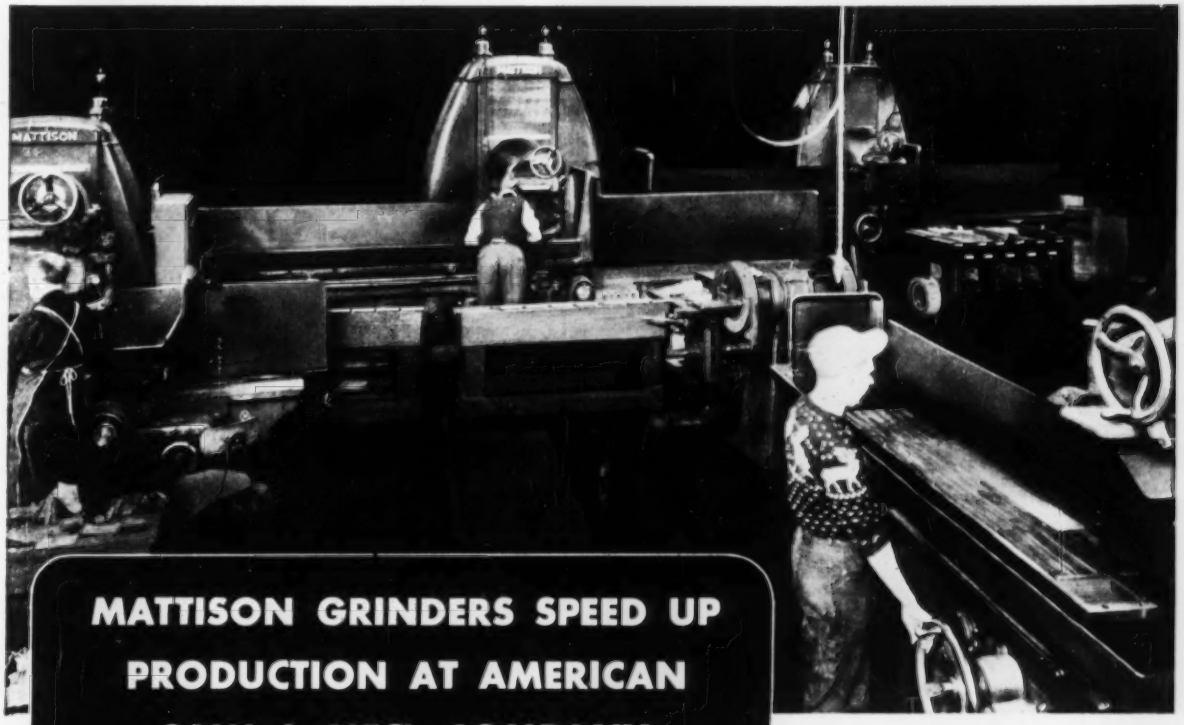
4 55-79



MATTISON GRINDERS SPEED UP PRODUCTION AT AMERICAN SAW & MFG. COMPANY

● The four Mattison High Powered Precision Surface Grinders shown above are used by American Saw & Mfg. Company for the grinding of annealed tool steel strips and bars on a real production basis in the manufacture of Lenox Precision-Master Ground Flat Stock. Exacting manufacturing specifications demand excellent finishes within close limits of accuracy.

The massive double column support, high power and rigidity of construction of the Mattison Grinder combine with accuracy and speed of operation to insure consistent precision results on a high production basis for American Saw & Mfg. Company. For complete information regarding the capabilities of the Mattison High Powered Precision Surface Grinder send for free circular.

MATTISON MACHINE WORKS

ROCKFORD · ILLINOIS

Be your own Fortune Teller... in one easy lesson

It doesn't take much experting to forecast the competitive edge that Allegheny Metal can give you.

If you're one who'd use stainless steel in plant or processing equipment, its ease of cleaning, low maintenance and long life can cut production costs and raise your quality standards. If you use it in a product, the matchless strength and perennial beauty of stainless steel can give you a bale of extra value to sell.

Either way, you'll have something going for you when the chips are down . . . when materials are plentiful but orders are tough. ● *Now's* the time to start Allegheny Metal working for you, and we're ready to help every possible way. ***Allegheny Ludlum Steel Corporation, Oliver Building, Pittsburgh 22, Pa.***

You can make it **BETTER** with

Allegheny Metal

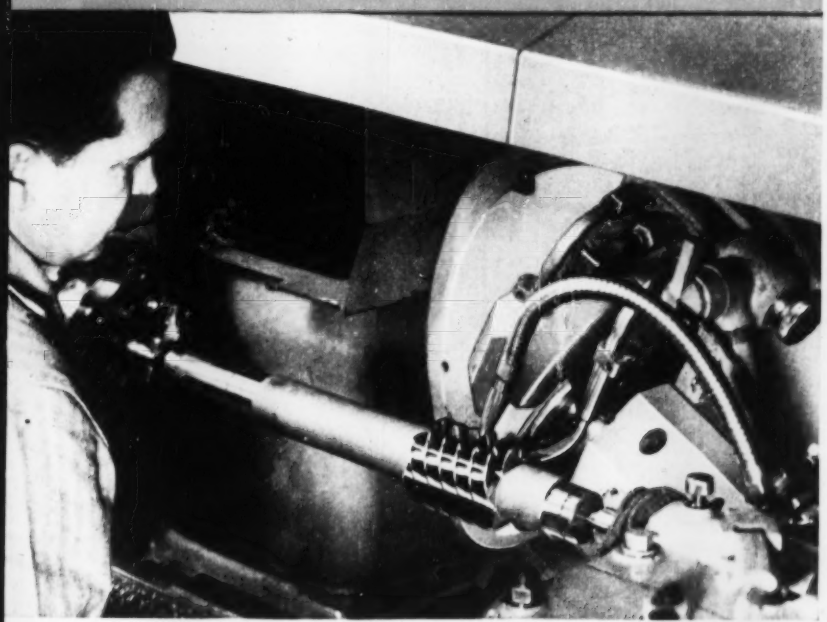
Warehouse stocks carried by all Ryerson plants

AL® TIME-TESTED STAINLESS STEEL

W&D 4650 B

Grinding 5-Start Worm with 4" Lead

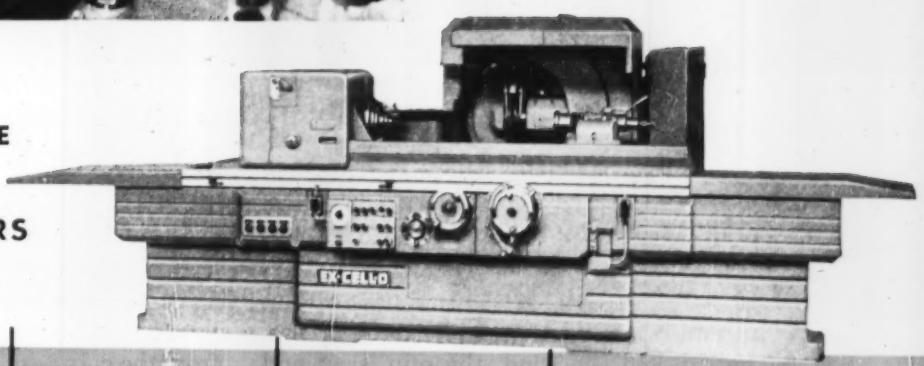
STANDARD STYLE 36 EX-CELL-O *Precision* THREAD GRINDER



In the photograph at the left the operator is grinding a worm shaft for use in a special machine. The part is about 22" long and the worm is 4½" long, 3.430" O.D., has 5 starts, a pitch of .800", a lead of 4" and a tooth depth of .5454". The worm was ground in two operations on a standard Style 36 Thread Grinder. It was rough ground from the solid, hardened, then finish ground.

For complete information and specifications on the Style 36 and other Ex-Cell-O Thread Grinders contact your local representative or write today to Ex-Cell-O.

XLO



A COMPLETE LINE OF PRECISION THREAD GRINDERS

STYLE 50
Precision Thread Grinder—a versatile machine for external work, also available with internal attachment.

STYLE 33
Precision Thread Grinder—a high production machine for external work.

STYLE 39-A
Precision Thread Grinder—a high production machine for internal threads.

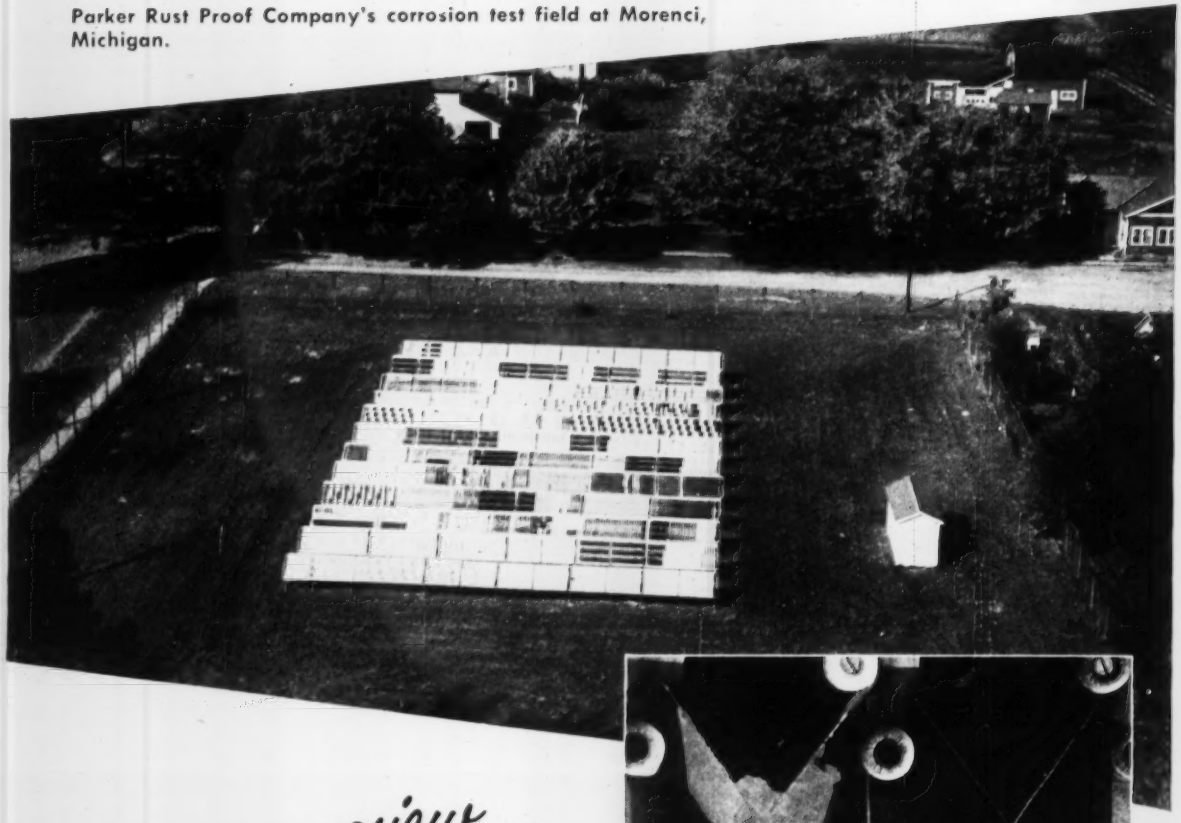
STYLE 36
Precision Thread Grinder—a versatile machine for extra long external threads, available with internal attachment.

EX-CELL-O CORPORATION • Detroit 32, Michigan

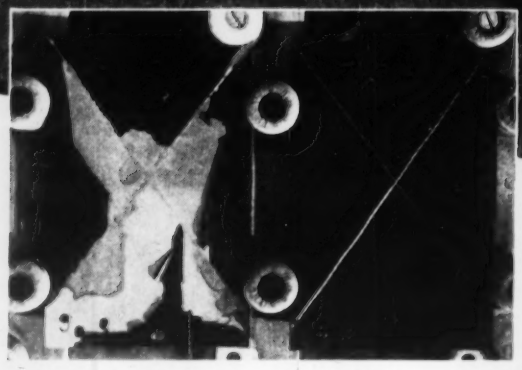
MANUFACTURERS OF PRECISION MACHINE TOOLS • GRINDING SPINDLES • CUTTING TOOLS • RAILROAD PINS AND BUSHINGS • DRILL JIG BUSHINGS • AIRCRAFT AND MISCELLANEOUS PRODUCTION PARTS • DAIRY EQUIPMENT

53-35

Parker Rust Proof Company's corrosion test field at Morenci, Michigan.



Birds-eye view of a strange crop



What weather does to finishes! Panel left, paint over untreated aluminum. Panel right, paint over Bonderite-treated aluminum. 11 months outdoor exposure.

A crop of 6,400 metal panels is tended in Parker Rust Proof's outdoor test field. The harvest is facts on the durability of various finishes over various metals.

Conditions here are the same as are met by painted products in daily outdoor use. The sun and the wind, the rain, sleet and snow pound at these panels continually. Parker technicians watch each set of panels individually, observe their condition, chart results at regular intervals.

This large-scale outdoor testing program, continuous since 1935, has helped build Parker's great fund of valuable information on how to control corrosion. The facts we learn from the corrosion test field are passed on to guide our customers to more effective, more economical surface treatments for metals.

*Bonderite, Bonderlube, Parco, Parco Lubrite—Reg. U.S. Pat. Off.

Since 1915—leader in the field

PARKER RUST PROOF COMPANY

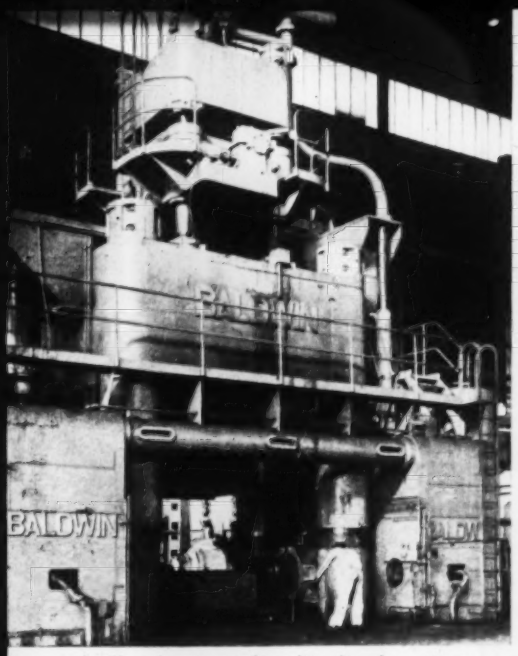
2158 E. Milwaukee Ave., Detroit 11, Michigan

BONDERITE	BONDERITE and BONDERLUBE	PARCO COMPOUND	PARCO LUBRITE
corrosion resistant paint base	aids in cold forming of metals	rust resistant	wear resistant for friction surfaces

SAVING MONEY BY *Forging*

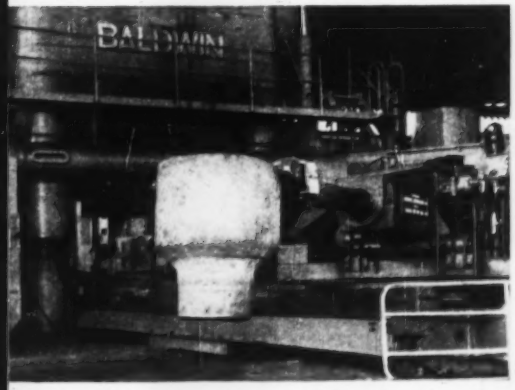
A 3590 POUND THROTTLE VALVE BODY

A large size and intricate shape has been forged at Cameron. The result—homogeneous shapes, controlled grain flow and less machining time. Truly a new era in steel forging.



The horizontal split die has just opened after forging a throttle valve body.

The throttle valve body, having been pierced by the two side acting rams and the down acting ram, is removed from the die set.



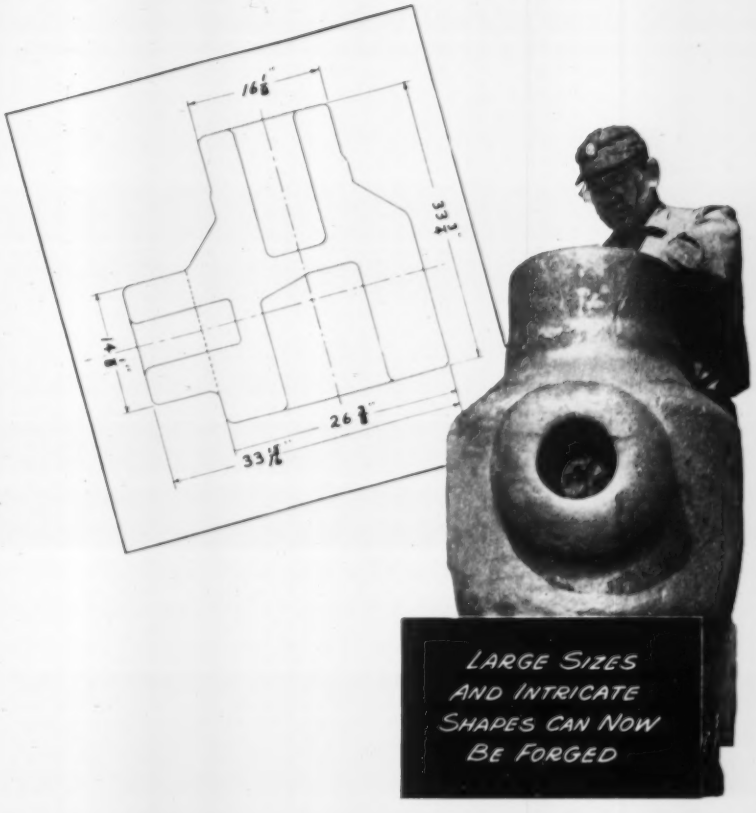
The manipulator is placing the 3,590 pound forging to one side for further processing.

For further information write

FORGE AND ORDNANCE DIVISION

Cameron

IRON WORKS, INC.
HOUSTON, TEXAS



LARGE SIZES AND INTRICATE SHAPES CAN NOW BE FORGED

EXPANDED METAL

the ideal material for conveyor guards

Conveyor guard, made by Hilmar, Inc., of Royal Oak, Mich., using Penmetal Expanded Metal.

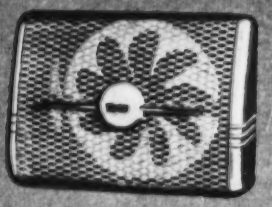
because it is low in initial cost, strong and rigid . . . yet is light in weight and permits easy visibility.

Penmetal expanded metal is sheet metal that has been slit and expanded to as much as ten times its original width. Up to 80% lighter than solid sheet of the same dimensions, the diamond truss pattern adds rigidity and strength.

Available in corrosion-resistant metals as well as carbon steel, large or small mesh, light or heavy gauge. Easily formed, shaped and welded.

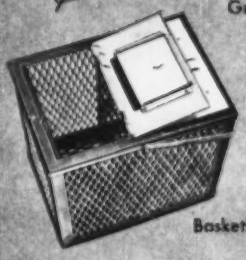
Send for catalog which gives mesh sizes, weights and dimensions, and shows many profitable ways in which you can use Penmetal expanded metal. No cost or obligation.

A FEW OTHER USES OF PENMETAL EXPANDED METAL

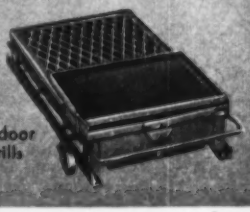


Fan Enclosures

Heater Guards



Baskets



Outdoor Grills

PENN METAL COMPANY, INC.

General Sales Office: 205 East 42nd Street, New York 17, N. Y.

Penmetal

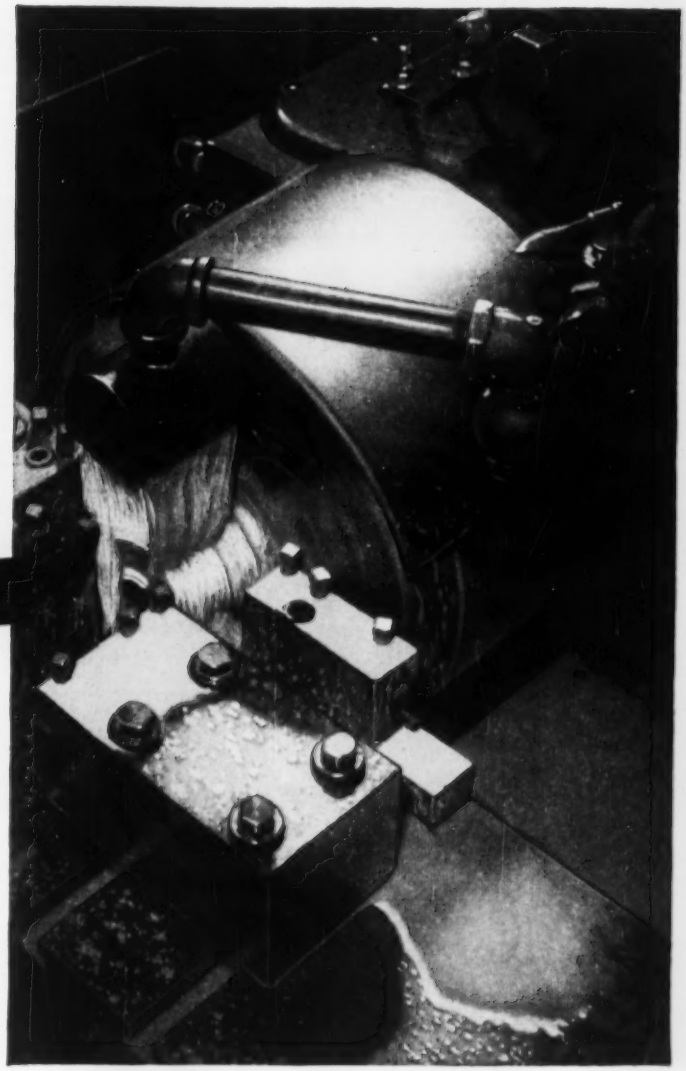
District Sales Offices: Boston, Philadelphia, Washington, Parkersburg (W. Va.), Detroit, Chicago, Dallas, Los Angeles, San Francisco, Seattle

PM-22

YOU BE THE JUDGE FOR

DASCO

SUPER SOLUBLE BASE



THE trial of Dasco in many plants has led to this judgment: Dasco Super Soluble Base is a heavy duty water-mix cutting fluid base of unusual versatility. It gives superior performance in mixtures of 1-40 and higher for turning, boring, reaming, drilling and milling and 1-100 and higher for grinding. Only unusual operations may require richer mixtures

TRIAL 1 OPERATION: Turning complete O. D. Nozzle insert for Rockets, B1117 steel

Dasco Performance: One part Dasco Super Soluble Base and 75 parts water on chucking machines increased tool life approximately 35%. Production increased from 50 to 400 pieces in 8 hours. Tool changes decreased from 27 tools per 8 hours using a competitive soluble oil to 12 tools per 8 hours with Dasco Super Soluble Base.

TRIAL 2 OPERATION: Drilling, counterboring and reaming 90MM Projectiles, A.I.S.I. 1055 forgings

Dasco Performance: Number of pieces per set of tools averaged 250 for a rich mixture of competitive heavy duty soluble oil. A 1-20 mixture of Dasco Super Soluble Base produced 500 pieces per set of tools.

TRIAL 3 OPERATION: Internal grinding of steel ring
Machine: Bryant Internal Grinder

Dasco Performance: A 1-150 mixture of Dasco Super Soluble Base replaced a 1-80 mixture of a competitive soluble oil. In addition the competitive product required a rust preventative. Dasco, even at the long dilution, has been in the machine over a month: no rusting has been experienced.

More Than a "Coolant" is Needed

D.A. Stuart Oil co.
EST. 1865 LIMITED

TIME-TESTED CUTTING FLUIDS AND LUBRICANTS
2735-37 S. Troy St., Chicago 23, Illinois

In Canada: R. W. Horsey Canada, Ltd.
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SEND COUPON FOR COMPLETE DATA
D. A. STUART OIL CO., Ltd.
2735-37 S. Troy St., Chicago 23, Illinois

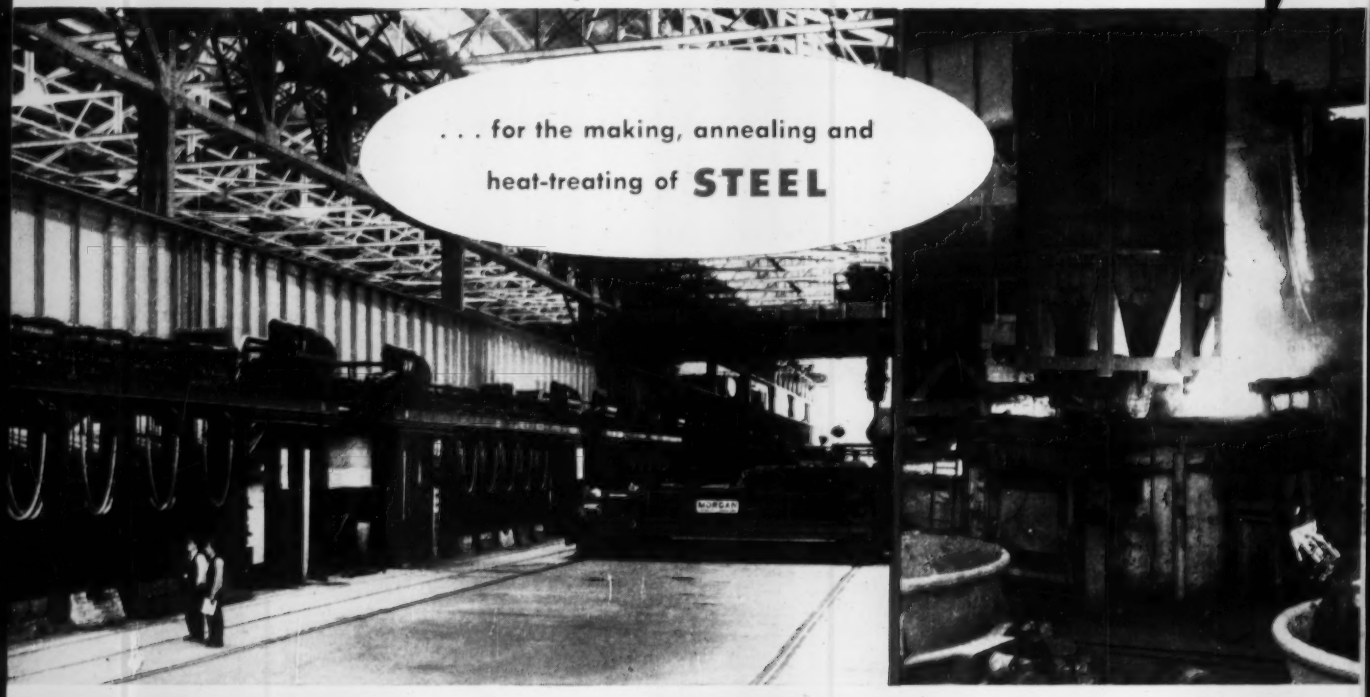
Check One: ☐ Have Stuart Representative Call
☐ Send Data on Dasco

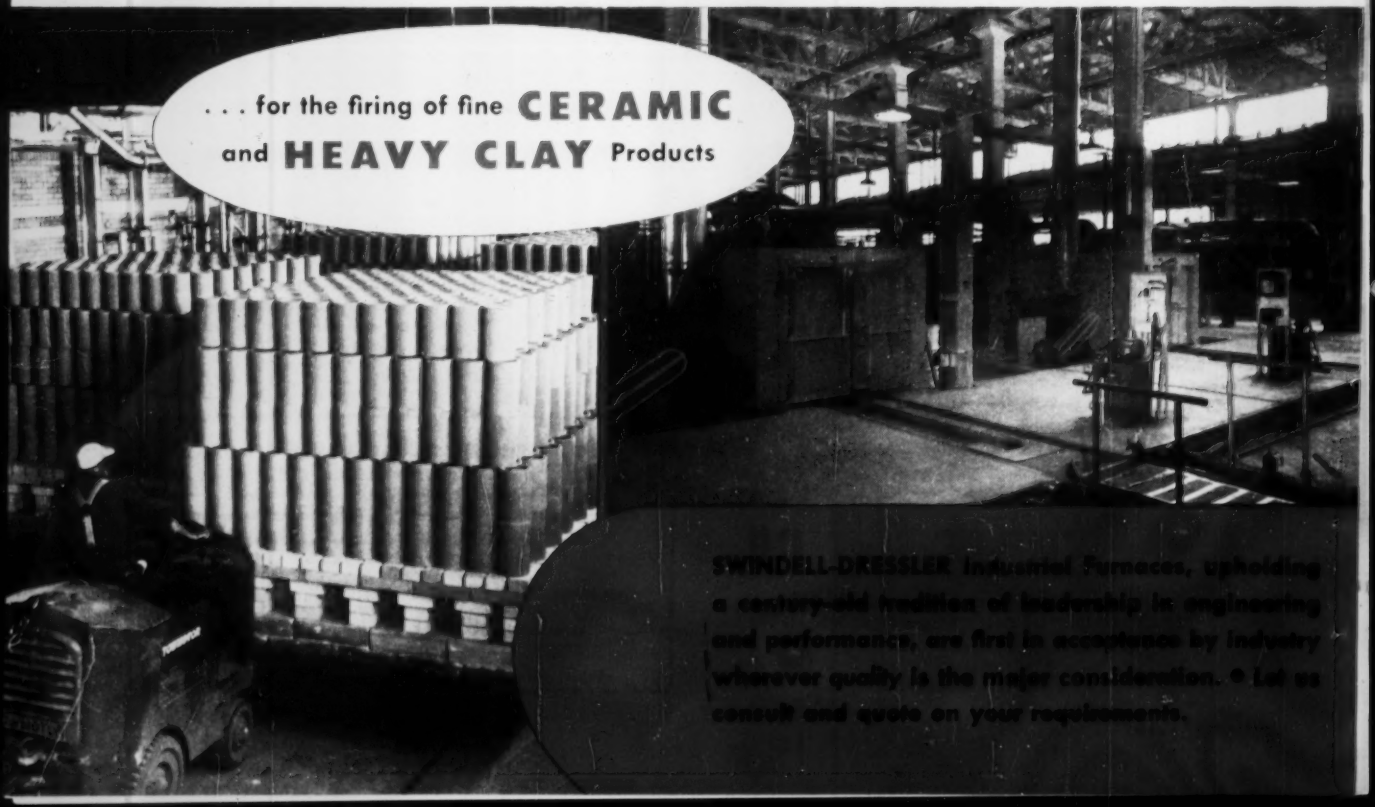
Your Name _____
(Please Print)

Title _____

Clip to Letterhead and Mail

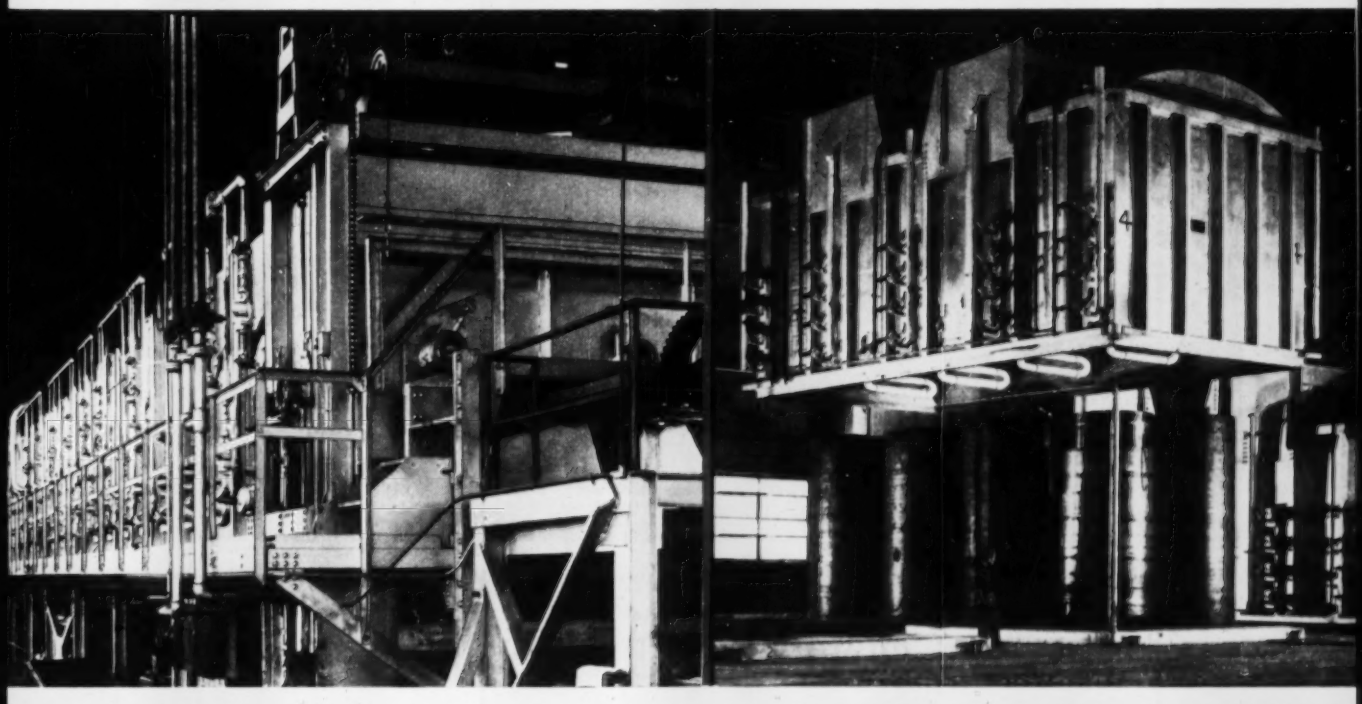
SWINDELL-DRESSLER



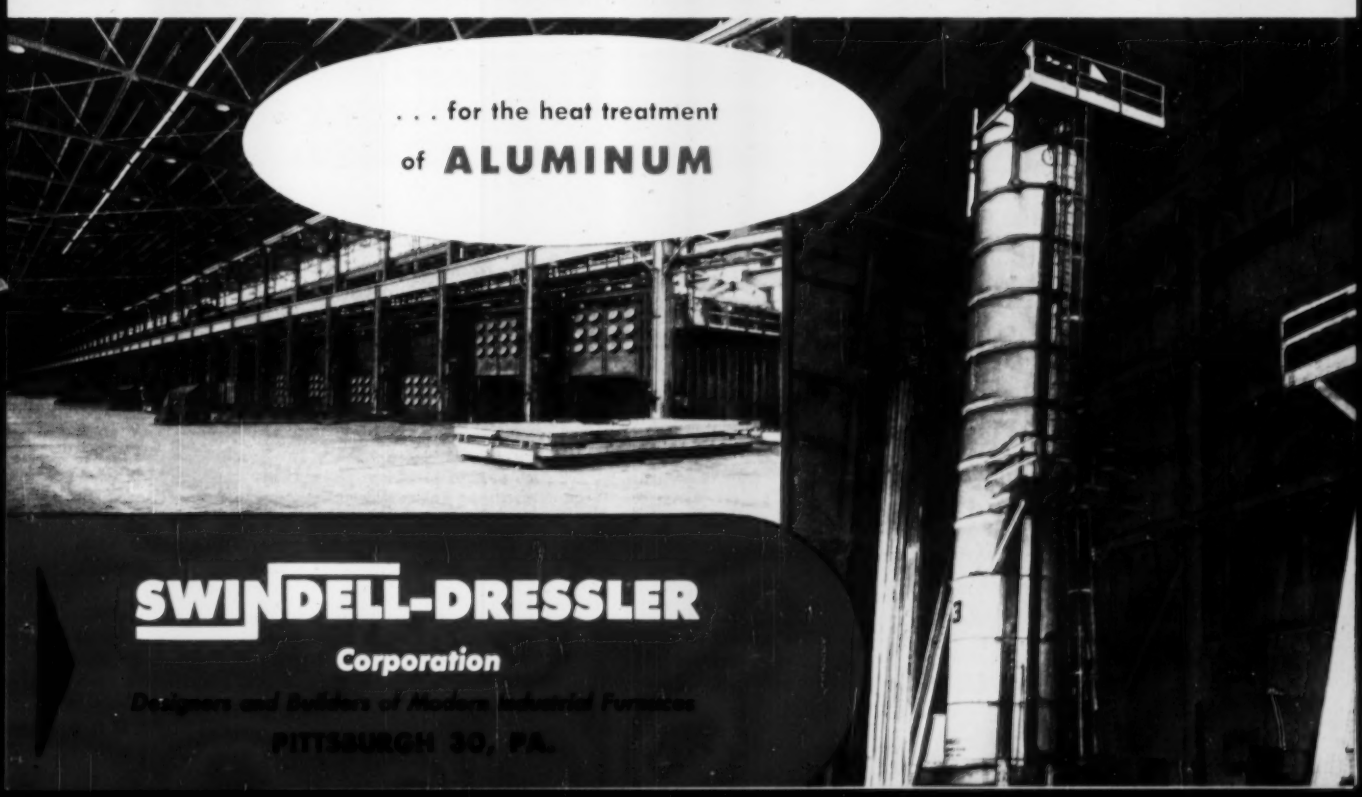


SWINDELL-DRESSLER Industrial Furnaces, upholding a century-old tradition of leadership in engineering and performance, are first in acceptance by industry wherever quality is the major consideration. • Let us consult and quote on your requirements.

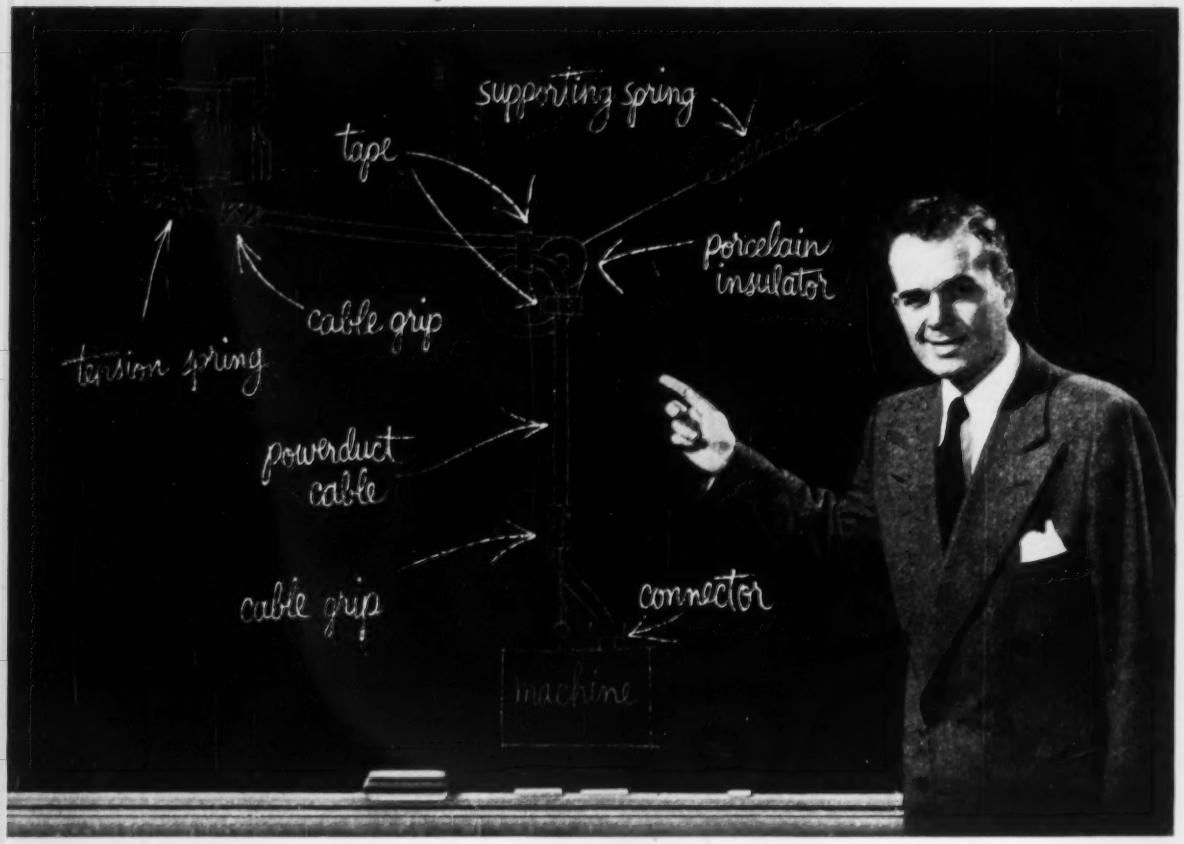
Modern INDUSTRIAL FURNACES



. . . for the heat treatment
of **ALUMINUM**

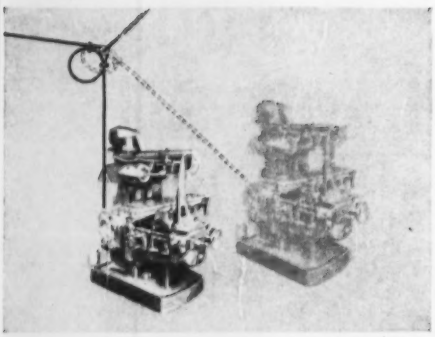


SWINDELL-DRESSLER
Corporation
Designers and Builders of Modern Industrial Furnaces
PITTSBURGH 30, PA.



See how easily flexible Powerduct Cable plugs in. Spring keeps cable taut. For simplicity of installation and relocation, compare this cable with conduit.

No busduct system is truly flexible without this New Powerduct Cable



Mobility of machinery is increased. Powerduct Cable adds to usefulness of many types of equipment.

It's the only nonmetallic-armored busdrop cable UL approved for this hard use; cuts cost of relocating machines

Your plant may well suffer from hardening of the power arteries. Here's why. Even if you have a modern busduct system, it may be flexible *only so far as it goes.* You may still have to rip out permanent or semi-permanent wiring every time you rearrange important machines. That's costly.

Here's how to remedy this situation. Match your present busduct system with money-saving ANACONDA Powerduct Cable. It's the only cable of its type approved by Underwriters' Laboratories, Inc. for busway branches under section 3646, 1951 National Electric Code.

You save many ways. Powerduct Cable is much cheaper to install than conduit. It handles easily. Grips prevent cable creep. No time is lost. You get circuit capacity at any point for any load at any time. It's a cinch to relocate. Coil (see illustration) makes local changes easy.

How tough is it? Its flame-retardant jacket, woven like a fire hose, takes heavy mechanical abuse, won't fray. Cold-flow is no problem. Cutting compounds, oil, acid, water, grease won't harm it.

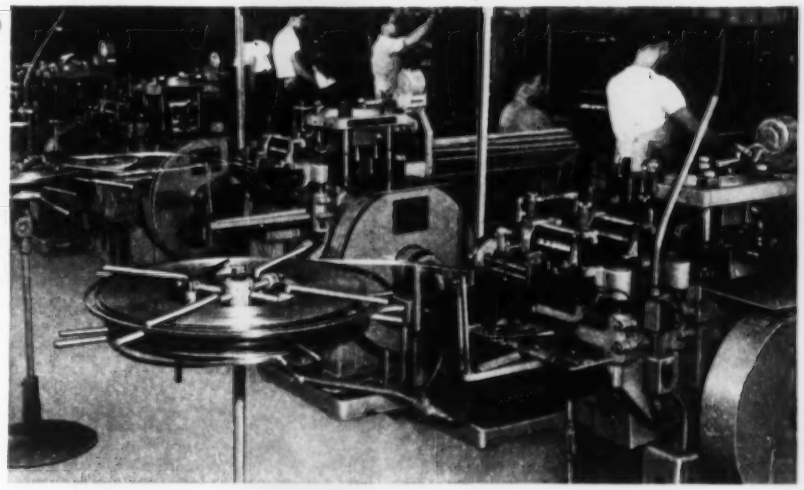
Plan now to add flexible Powerduct Cable to your busduct system. See your regular supplier and insist on the ANACONDA Trademark—your positive proof of UL approval for this use. Anaconda Wire & Cable Company, 25 Broadway, New York 4, N. Y. 52377

the right cable for the job

ANACONDA®

wire and cable

Battery of 25-ton Henry & Wright Dieing Machines equipped with double dies. Barber-Colman also uses 50-ton and 60-ton H & W machines to produce parts for its Air Distribution, Aircraft controls, Overdoor, Small Motor and Textile Divisions.



HENRY & WRIGHT DIEING MACHINES

GIVE BARBER-COLMAN UP TO 470 PIECES A MINUTE

DOUBLE DIE SET UP is used whenever possible by Barber-Colman Company to take full advantage of the high speed and accuracy of Henry & Wright Dieing Machines. Twin dies enable the 25-tonners, when operated at 235 strokes a minute, to stamp out 470 pieces a minute.

More and more leading companies such as Barber-Colman are shifting metal stamping production to Henry & Wright Dieing Machines. The reasons make dollars and cents. One Dieing Machine does the work of five to ten ordinary presses — and that means one operator, one inspection, one trip for parts removal instead of several. You can pull the throttle way out on speed, yet get increased die life and improved precision in your work. Get the whole story about Henry & Wright Dieing Machines and you'll prove to yourself why this most modern of presses delivers . . . A PRICE CUT WITH EVERY STROKE.

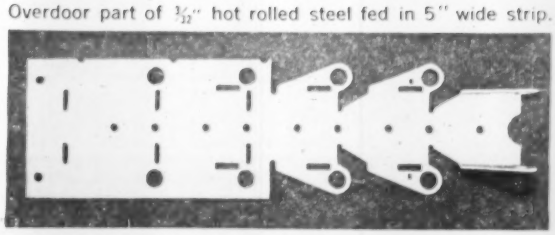
HENRY & WRIGHT

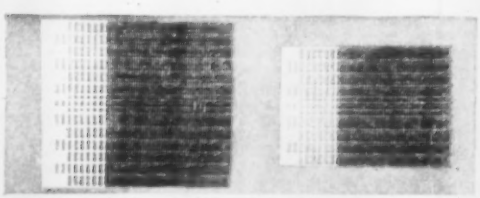
DIVISION OF EMHART MFG. CO.

HARTFORD 1, CONNECTICUT

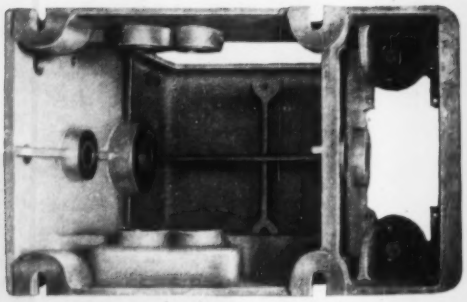
1953 CATALOG AVAILABLE — Eye-opening facts about Henry & Wright Dieing Machines. Write for your copy to Henry & Wright, 441 Windsor St., Hartford, Connecticut.

Overdoor part of $\frac{1}{32}$" hot rolled steel fed in 5" wide strip.

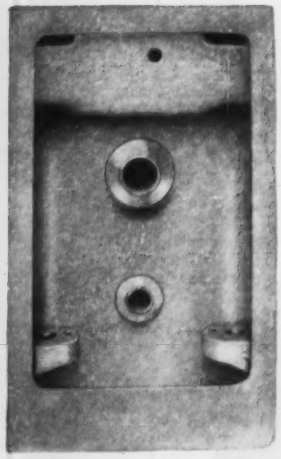




Air distribution vents stamped out of .018-.020 cold rolled steel in widths ranging from 7¾" to 13¾".

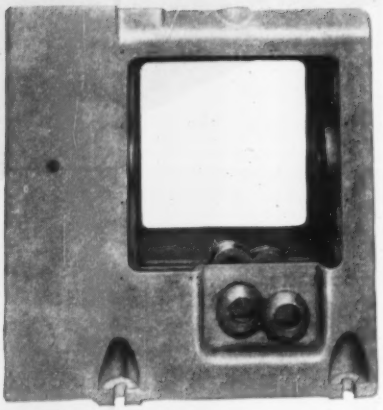


BOTTOM



END

Figured from any angle...



SIDE

. . . this GRAY IRON casting does a better job for 50% less!

Production of a fabricated steel base for a press formerly cost the manufacturer approximately $302.00 for material and labor. By redesigning this base as a Gray Iron casting, the material and labor costs were reduced to approximately $150.00 . . . *a 50% saving!* Reduced machining time saved another 15%.

In addition to these substantial cash savings, the manufacturer also reports that this Gray Iron casting has proved to be a better all-around design than the fabricated steel base . . . both in appearance and in performance.

You, too, will find that it pays to use Gray Iron . . . from both engineering and economy angles. We will be glad to furnish you technical information on the many advantages of the Gray Iron casting process.

MAKE IT *BETTER* WITH GRAY IRON

75% of all cast metal products are Gray Iron

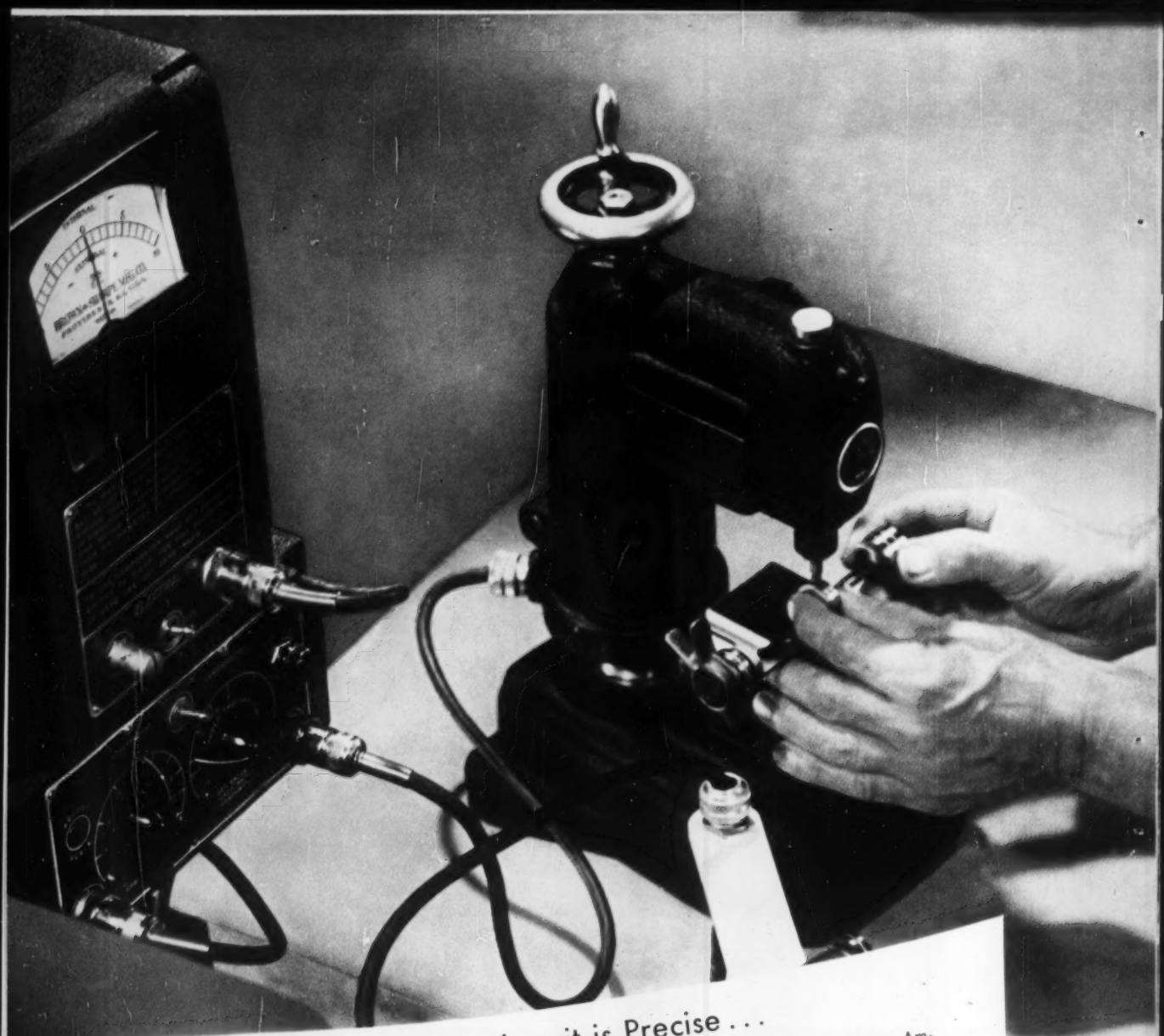
GRAY IRON FOUNDERS' SOCIETY, INC.

NATIONAL CITY-E. 6th BLDG., CLEVELAND 14, OHIO

Relax! Hold to a Tenth and Break Production Records

. . . with the No. 5 Plain Grinding Machine. You conserve time, motion, and effort with the No. 5, and consistently grind small parts to a tenth or less! The recessed design of the base and convenient grouping of all controls permit your operators to sit comfortably at the machine while maintaining highest production. Automatic cycles reduce operator's task to loading, starting, and unloading. When equipped with ELECTRALIGN, alignment control to 0.0001" becomes simple and positive. Get the complete story . . . write for detailed Bulletin on the No. 5—one of an outstanding line of 18 Grinding Machines offered by Brown & Sharpe.

Brown & Sharpe



As Practical as it is Precise . . .

. . . **Brown & Sharpe Electronic Measuring Equipment.** Here is a "foolproof" way to let your machine operators measure from 0.0001" to 0.00001"—with human error practically eliminated. The Electronic Amplifier (shown here attached to machine and equipped for either precision aligning of work in the machine or for external measuring) magnifies measurements made on comparators 1800 to 18,000 times. Its true linear response simplifies setting—only one master needed. And the same Amplifier may be used with a number of measuring devices—for external or internal measuring or with special gaging fixtures. Fast response, high stability, and freedom from change by temperature or voltage, have all contributed to making the equipment extremely practical wherever precise measuring to close limits is essential. Write for detailed information on these precision measuring devices.

BUY THROUGH YOUR LOCAL DISTRIBUTOR

Brown & Sharpe

BS

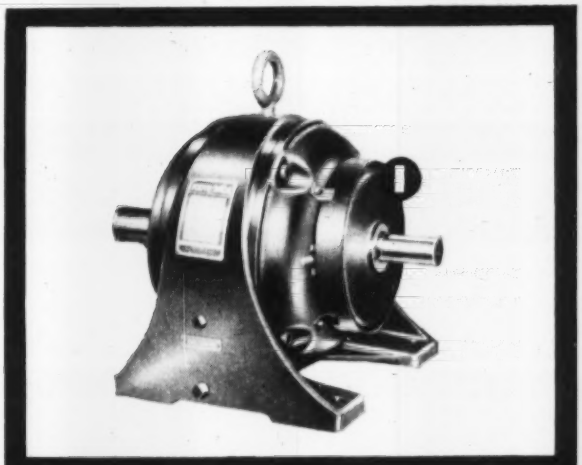
BROWN & SHARPE MFG. CO., PROVIDENCE 1, R. I., U.S.A.

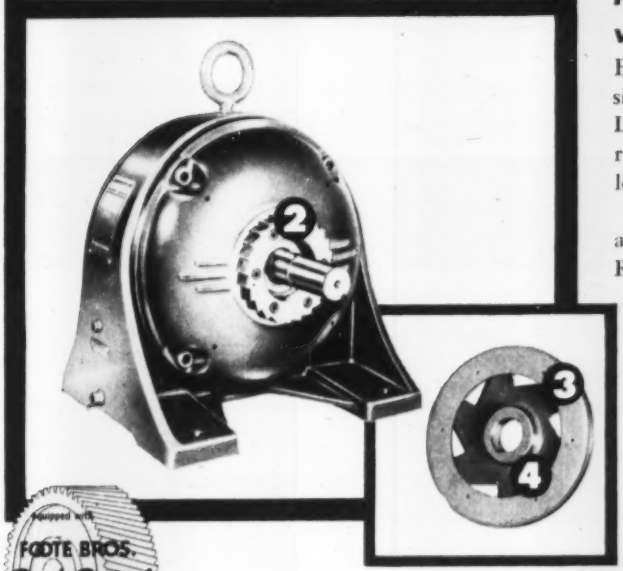
Milling Machines • Grinding Machines • Screw Machines • Cutters • Machine Tool Accessories • Machinists' Tools
Electronic Measuring Equipment • Johansson Gage Blocks • Permanent Magnet Chucks • Pumps

Printed in U.S.A.

NOW ...built-in protection against reversing!

...NEW FOOTE BROS. BACKSTOP for LINE-O-POWER!





NOW . . . Positive prevention of reverse rotation! Famous straight line Line-O-Power Drives now offered with the new, built-in Foote Bros. Backstop as optional equipment!

Sturdy, compact, symmetrical — this Backstop automatically stops shaft reversal. During forward motion, operation is without contact — *noiseless and wear-free.* Because of advanced design, you can order it without regard to application or service factors . . . and you can change it in the field, in minutes, for opposite rotation. For Line-O-Powers now in service, the mechanism is quickly installed at the Foote Bros. Plant.

Here's why you get more with LINE-O-POWER Drives

Economical to buy, economical to run. Ruggedly designed for toughest jobs. Engineered around Duti-Rated Lifetime Gearing with file-hard teeth and tough, resilient cores. Higher efficiency, greater capacity and longer life — in minimum space.

In straight line design, low-cost Line-O-Power Drives are foot mounted for floor, wall or ceiling applications. Ratios range up to 238 to 1, capacities up to 178 h.p.

For right angle applications — horizontal or vertical — choose the worm-helical gear Line-O-Power, foot or flange mounted. Flange-mounted units available with standard output shaft or with an extended low-speed bearing housing for maximum over-hung load support. With ratios ranging up to 2,726 to 1, Right Angle Line-O-Power Drives are ideal for slow speed jobs.

Call your Foote Bros. representative, or write for helpful information.

Powered with FOOTE BROS. Duti-Rated LIFETIME GEARING

This Trademark Stands for the Finest in Industrial Gearing

1. **Sturdy Guard — Shields moving parts.**
2. **Machined-steel Ratchet Plate — Securely bolted to Line-O-Power housing, but easily reversed for change in direction of rotation.**
3. **Cast Backstop Housing — Rigidly keyed to input shaft.**
4. **Hardened Ratchet Pawls — Lock against ratchet plate under spring pressure to prevent counter-rotation.**

Foote Bros.-Louis Allis Gearmotors

Hygrade Drives

Maxi-Power Drives

FOOTE BROS.

Better Power Transmission Through Better Gears

FOOTE BROS. GEAR AND MACHINE CORPORATION
Dept. X, 4545 South Western Boulevard, Chicago 9, Illinois

Please send me information on:

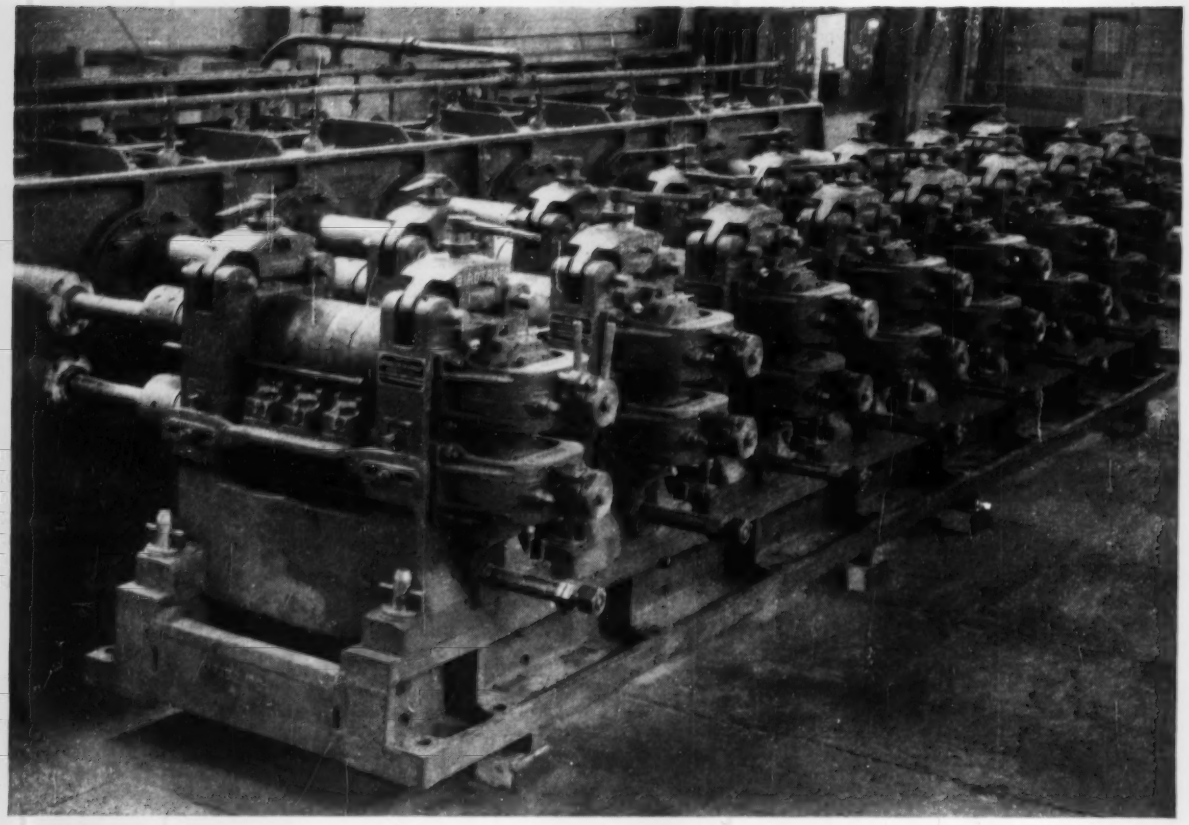
- ☐ Straight Line-O-Power Drives.
- ☐ New Foote Bros. Backstop.
- ☐ Right Angle Line-O-Power Drives.

Name .....

Company .....

Address .....

City ..... Zone ..... State .....



MODERNIZE YOUR ROD MILL

for Increased Production... Lower Costs

Birdsboro's advanced engineering developed a new high speed finishing train, coilers and conveyors to modernize an existing mill. The eight stand finishing train is shown above at shop assembly.

If your production is lagging — or you find operating and maintenance costs are top heavy, call on Birdsboro. We are well equipped and have the engineering skill to modernize existing equipment—or replace it with the most up-to-date, efficient steel mill machinery.

MM-20-SE-R

BIRDSBORO

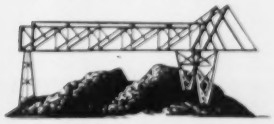
BIRDSBORO STEEL FOUNDRY & MACHINE CO., BIRDSBORO, PENNA. **STEEL MILL MACHINERY** Offices in Birdsboro, Pa. and Pittsburgh, Pa.

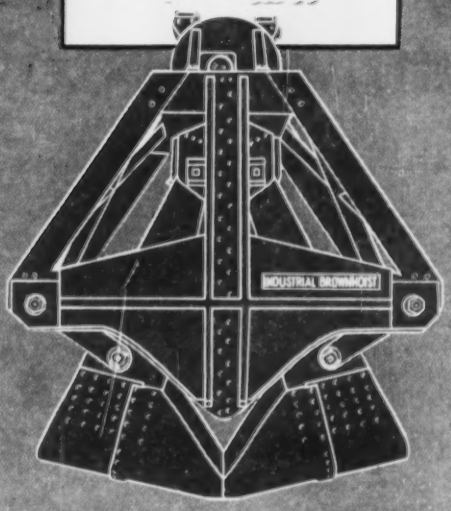
designers and builders of: Steel Mill Machinery • Hydraulic Presses • Crushing Machinery • Rolls • Special Machinery • Steel Castings

BROWNHOIST

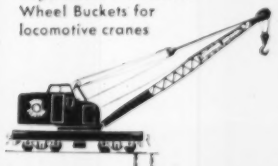
ALSO BUILDS BETTER BUCKETS

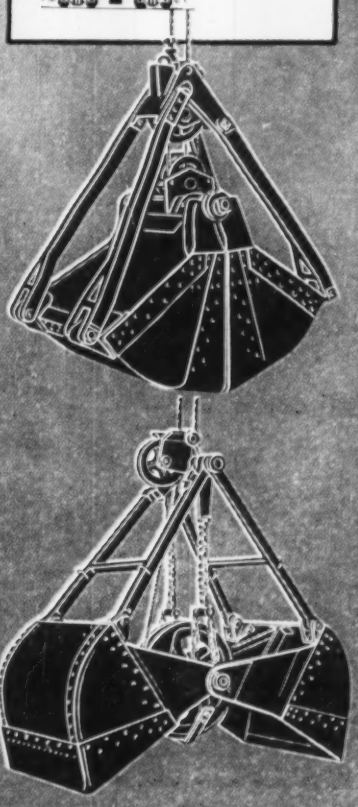
Link Type Buckets for boat unloaders, bridge cranes, fast plants





Rope Reeve and Power Wheel Buckets for locomotive cranes

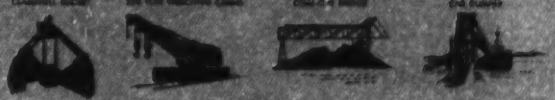




Brownhoist Buckets are designed for specific jobs and especially engineered to meet the toughest materials handling requirements. They take deep, full capacity bites that move more materials per lift, thus making possible considerable savings in man-hours and production time. They are built for endurance and dependability, the same qualities that have accounted for Brownhoist leadership in the bulk materials handling field for more than three quarters of a century. Railroads, steel mills and dock operators who are loading and unloading coal, ore, slag or other bulk materials will find it pays to discuss their requirements with Brownhoist engineers.

164

BROWNHOIST builds better cranes



INDUSTRIAL BROWNHOIST CORPORATION • BAY CITY, MICHIGAN • DISTRICT OFFICES: New York, Philadelphia, Cleveland, San Francisco, Chicago; Canadian Brownhoist, Ltd., Montreal, Quebec • AGENCIES: Detroit, Birmingham, Houston, Los Angeles

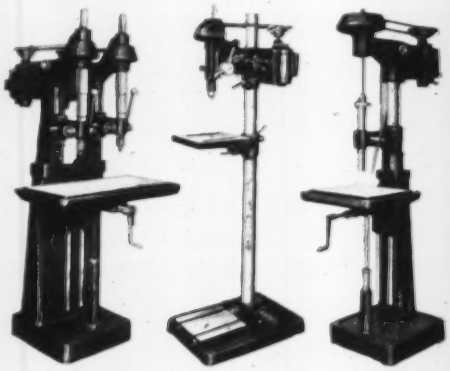
"Buffalo" REDUCES METALWORKING COSTS!

There is a "production-wise" drill, punch, shear, bending roll or wrapping roll in the "Buffalo" line that's bound to speed up your operation. Beside the machines shown here, "Buffalo" builds mill type shears for punching, shearing and blanking; rapid acting punches; riveters; single and double end punches, shears and many others—all easy to operate, all time-savers on setup adjustments, all rigidly and accurately built to stand your heaviest production schedules. Write for bulletins.

BUFFALO FORGE COMPANY

158 Mortimer St. Buffalo, N. Y.

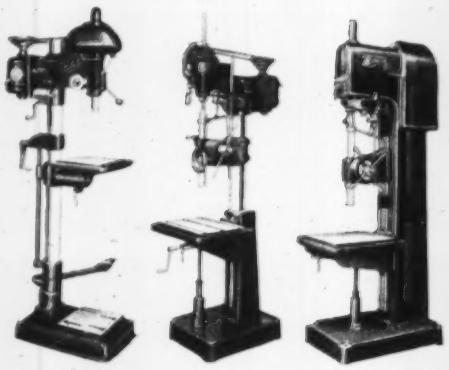
Canadian Blower & Forge Co., Ltd., Kitchener, Ont.



No. 14
High-Speed
3/8" drills
Bulletin 2726

No. 15
1/2"
Production Drills
Bulletin 2963

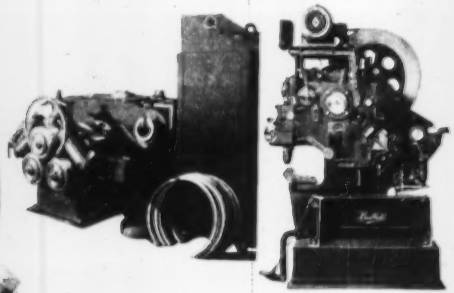
No. 16
Sensitive
7/8" Drills
Bulletin 2703



No. 18
1"
Production Drills
Bulletin 3123

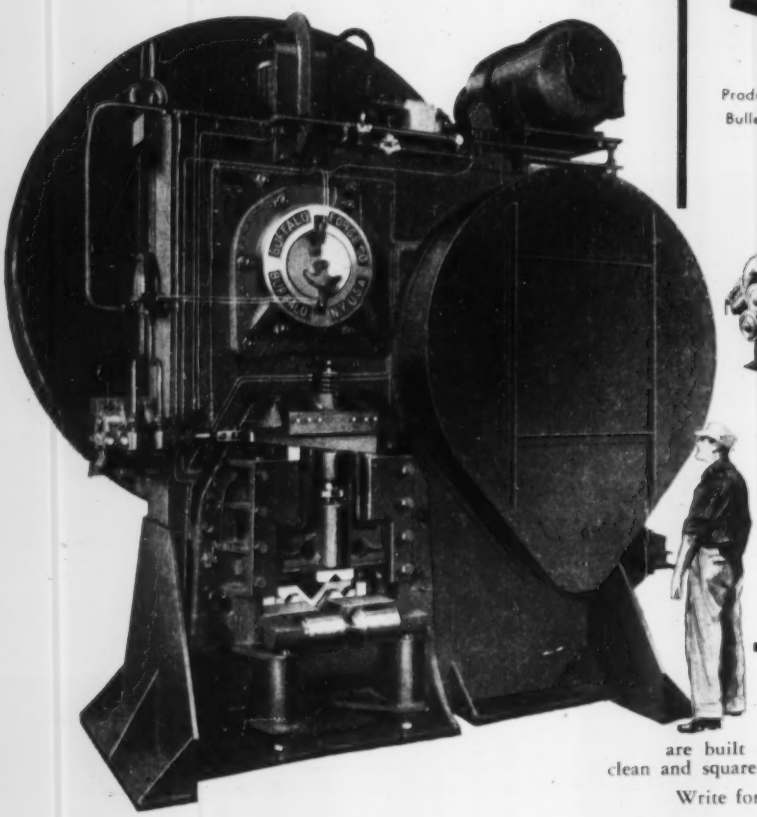
No. 22
Drill (up to 2"
holes in cast iron)
Bulletin 2989

"RPMster"
the drill with
1001 speeds
Bulletin 3257



"Buffalo" Bending Rolls make arcs, spirals, circles from structurals at production speed.
Bulletins
352 B and 3344

"Buffalo" Universal Iron Workers cut, punch, shear, notch, cope, miter—up to 3 operations at once.
Bulletin 360



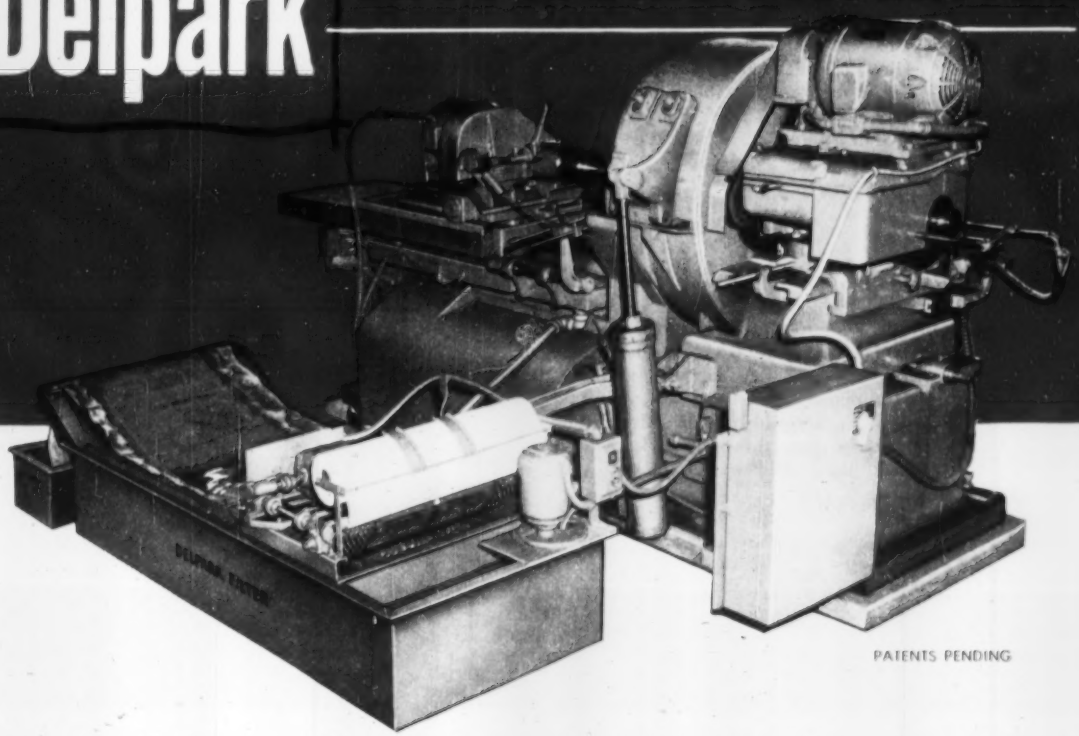
"Buffalo" Billet Shears are built in 11 sizes to cut up to 10" rounds clean and square — at high rates of speed.

Write for Bulletin 3295.

"Carefree and Inexpensive Operation"

SAYS WILLYS MOTORS, INC.
TOLEDO, OHIO
OF

Delpark INDUSTRIAL FILTRATION



PATENTS PENDING

The DELPARK Story runs true to form at *Willys Motors, Inc.* Here, where a number of DELPARK Filters are in service 16 hours a day, they operate with little attention at a minimum of cost.

Willys Motors says, "We never have to change the coolant, or clean the tank, excepting perhaps on a six month basis, to remove contaminants from floor sweepings. Time spent in cleaning tanks with conventional equipment would many times pay for the filter equipment."

There is one other point to remember: that DELPARK Filters make possible the full capabilities of fine precision grinders which otherwise would be impossible. Greater machine efficiency and fewer rejects add even more to the enormous savings made possible with DELPARK Filters.

DELPARK engineers are ready to help you with your specific problems. *Write today for more complete information.*

Delpark INDUSTRIAL FILTRATION

Backed by more than 30 years experience in Industrial Filtration
INDUSTRIAL FILTRATION COMPANY • LEBANON, INDIANA

INDUSTRIAL FILTRATION COMPANY
99 Industrial Avenue, Lebanon, Indiana

Gentlemen: We would like more information on DELPARK Industrial Filters applied to coolants.

Name _____ Title _____

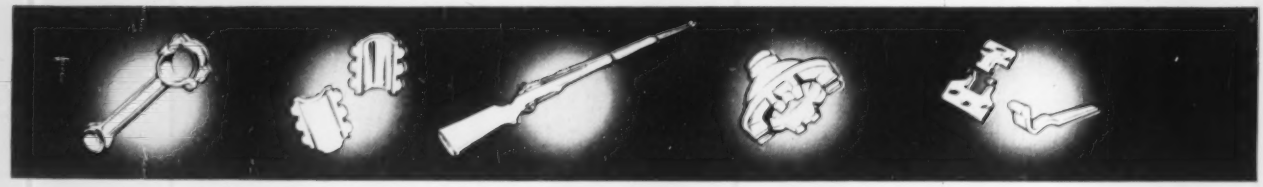
Company _____

Address _____

City _____ State _____

1 The year 1933 marked many automotive design and production advances. Among those on the production front was the first Detroit Broach tooling to broach connecting rods . . . an important advancement in terms of increased production, lower costs and better quality . . .

2 During the later thirties Detroit Broach continued to contribute to automotive broaching advancements. One example in 1938 was Detroit Broach tooling which made possible the complete finishing of main bearing caps cast in one piece in two passes . . .

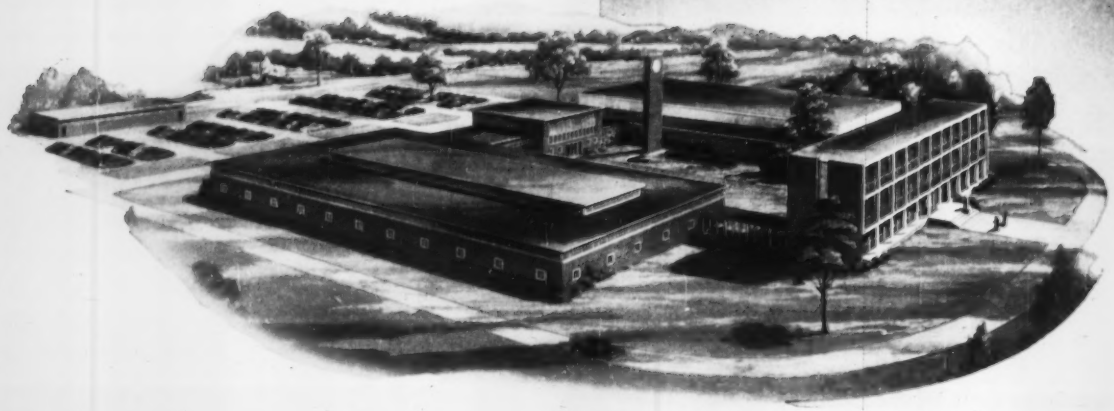


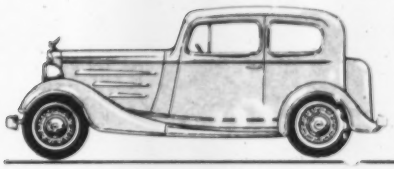
3 In the war years, the auto industry turned to war material and to Detroit Broach for the broach tooling for hundreds of parts. Typical was broach tooling to produce the rifling in gun barrels in a single pass and multiple-surface broaching operations on other gun parts . . .

4 Detroit Broach has continued to serve the auto industry in the post-war years. Tooling to broach differential cases, hinges, automatic transmission parts and innumerable other parts is helping to hold the line on rising production costs.

TODAY, automation has been introduced by Detroit Broach as an integral part of broach tooling. Parts are fed to, and carried away from, automatic broach tooling by specialized conveyor and hopper equipment. Tomorrow, too, one thing is sure . . . Detroit Broach will continue to pace the giant auto industry's need for better, more efficient production machining.

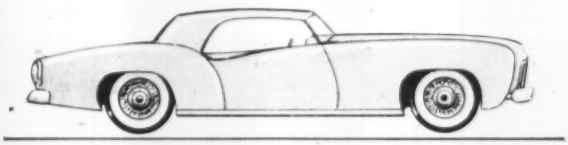
This is a view of the new, ultra-modern Detroit Broach plant and offices located in Rochester, Michigan — just outside Detroit. Designed by Sture Frolen, eminent Swedish architect, it embodies many important advancements that contribute to employee morale and manufacturing efficiency. Another example of the unusual facilities of Detroit Broach Company.





Broaching Pioneers

IN THE AUTOMOTIVE INDUSTRY



Master of mass production techniques, producing at a level where pennies per piece mean thousands of dollars per year, the automotive industry was among the first to recognize the economies of broaching.

Early, too, came recognition of Detroit Broach ingenuity and reliability in the design and manufacture of tooling that would pace production requirements. A small sample of that tooling is shown at the left.

in YOUR industry, too you will find many companies who rely on Detroit Broach to meet their needs for tooling that slashes cost-per-piece, boosts output and provides consistent and repetitive top-notch accuracy.

Detroit Broach engineers, Detroit Broach facilities, in fact the entire Detroit Broach team, are all keyed to one specialized skill. That skill is broaching. It is such specialization that has resulted in many of broaching's greatest advancements.

It will pay you, too, to have a talk with the Detroit Broach representative in your area. You will doubtless find many ways to lower the boom on rising production costs on present as well as proposed operations.

Detroit Broach COMPANY

ROCHESTER, MICHIGAN

Offices in Principal Cities Throughout the World

1164

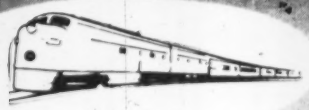
AEROQUIP SELF-SEALING COUPLINGS

AND FLEXIBLE HOSE LINES

Speed Maintenance

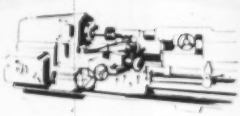
WHEREVER FLUID-CARRYING LINES MUST BE DISCONNECTED AND RECONNECTED

BUSES AND TRUCKS



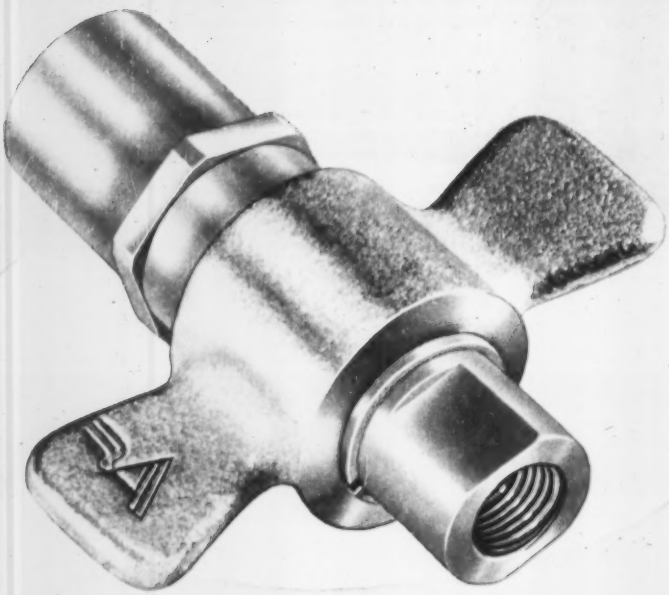
RAILROADS

OIL FIELD DRILLING RIGS



MACHINE TOOLS

MATERIALS HANDLING TRUCKS



Speed maintenance, *speed* repair operations and *speed* interchanging of accessories joined by fluid-carrying lines with Aeroquip Self-Sealing Couplings. Lines may be separated in a few seconds without loss of fluid. No air enters the system upon reconnection. There is no need to drain or prime the fluid system. One Self-Sealing Coupling takes the place of two shut-off valves.

Aeroquip

REG. TRADE MARK

AEROQUIP CORPORATION, JACKSON, MICHIGAN

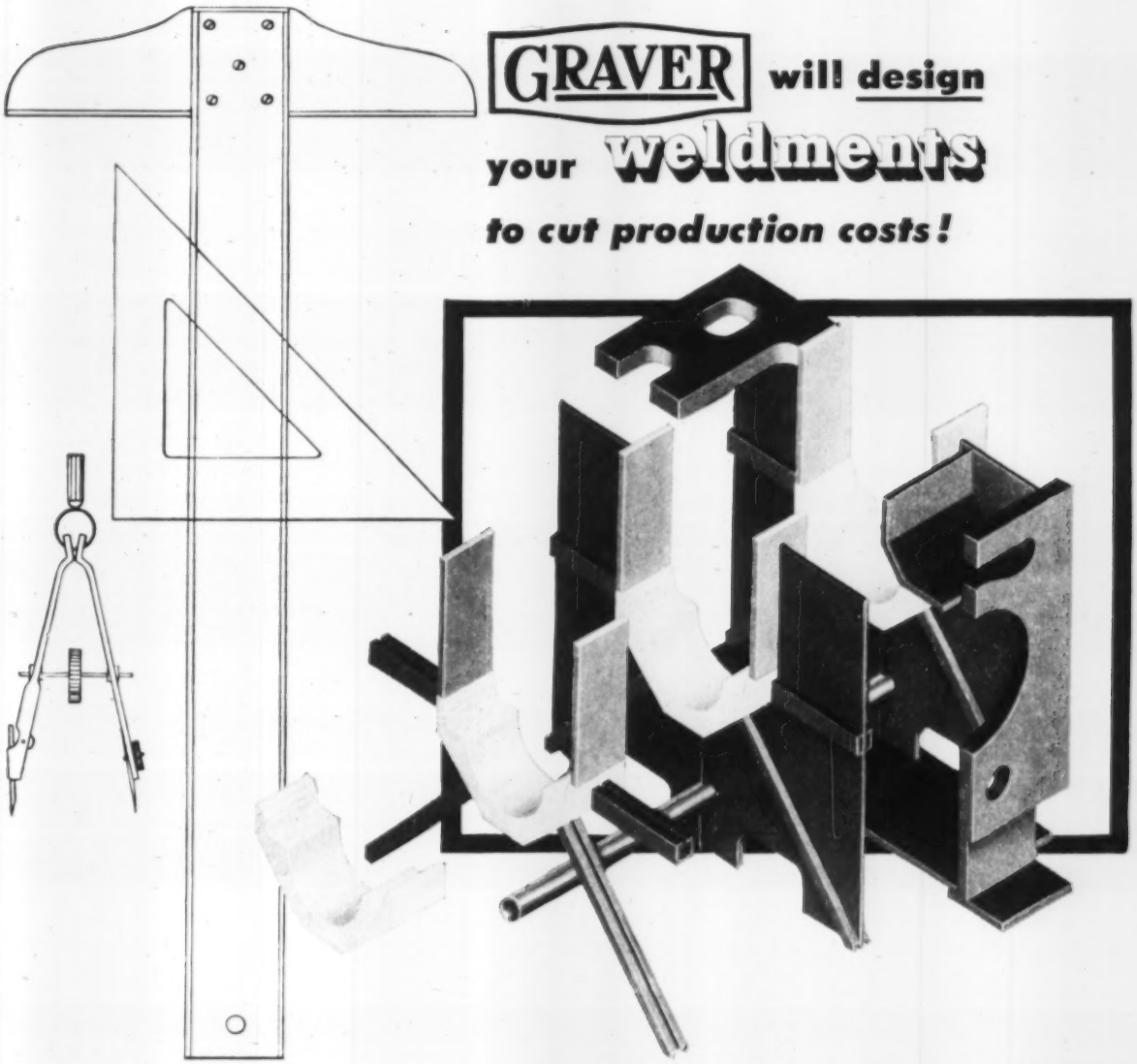
SALES OFFICES: Burbank, Calif. • Dayton, Ohio • Hagerstown, Md. • High Point, N. C. • Miami Springs, Fla. • Minneapolis, Minn. • Portland, Ore. • Wichita, Kan.

IN CANADA: Prenco Progress and Engineering Corporation Ltd., Toronto

IN ENGLAND: Super Oil Seals & Gaskets, Ltd., Birmingham

AEROQUIP PRODUCTS ARE FULLY PROTECTED BY PATENTS IN U.S.A. AND ABROAD

GRAVER will design your weldments to cut production costs!



Graver's Weldment Division is equipped to design your sub-assemblies and component parts, so that you may expect significant savings by simplifying manufacturing methods.

Graver uses all welding techniques for all types of alloys and carbon steel in thicknesses ranging from ¼ inch to 12 inches. The ability to maintain close tolerances . . . facilities that include one of the largest heat-treating furnaces in the country . . . and the employment of the latest, improved welding methods in successfully fabricating thousands of intricate weldments—all indicate Graver should be *your* weldment source.

Large or small, simple or complex, *all* Graver weldments reflect the top-quality work you have come to expect from Graver.

SEND FOR YOUR NEW WELDMENT BOOKLET

Graver has just completed a new authoritative booklet illustrating the many applications of Weldments in Industry. Send for your complimentary copy. Address: The Weldment Division

GRAVER
WELDMENTS

GRAVER TANK & MFG. CO., INC.

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New York • Chicago • Philadelphia • Atlanta • Detroit
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Sand Springs, Okla. • Odessa, Texas • Los Angeles • Casper, Wyo.

...and here is the double file loading feature of H-VW-M Full Automatic Conveyors

It's easy to see the advantages of this construction—double the capacity with the same machine. When less production is required only one rack is placed on each hanger arm—that's versatility, isn't it?

H-VW-M Full Automatic Conveyors are used daily for all types of plating—as well as anodizing, pickling, cleaning, phosphate coatings, bright dipping, painting, etching, and other finishing processes. They operate in a wide range of weight, current loads, and lifts. And they can be built with delayed set-down for varying immersion time, treatment by-pass mechanisms, air and solution agitation, racks with individual electrical control for each rack, or whatever special equipment the job requires—the ideal solution to problems of large quantity, high quality plating.

Full Automatic Conveyors are only one of many results of H-VW-M's more than eighty years of constant electroplating development. It's a continuous policy, best summed up in H-VW-M Platemanship...your working guarantee of the best that industry has to offer—not only in plating conveyors—but in every phase of plating and polishing.

8654

PLATEMANSHIP

PLATEMANSHIP
PLATING & POLISHING PROCESSES EQUIPMENT SUPPLIES

For complete information on H-VW-M Full Automatic Conveyors ask for Bulletin FA-103.

HANSON-VAN WINKLE-MUNNING CO. MATAWAN, NEW JERSEY U.S.A.

Your H-VW-M combination—of the most modern testing and development laboratory—of over 80 years experience in every phase of plating and polishing—of a complete equipment, process and supply line for every need.

HANSON-VAN WINKLE-MUNNING CO., MATAWAN, N. J.

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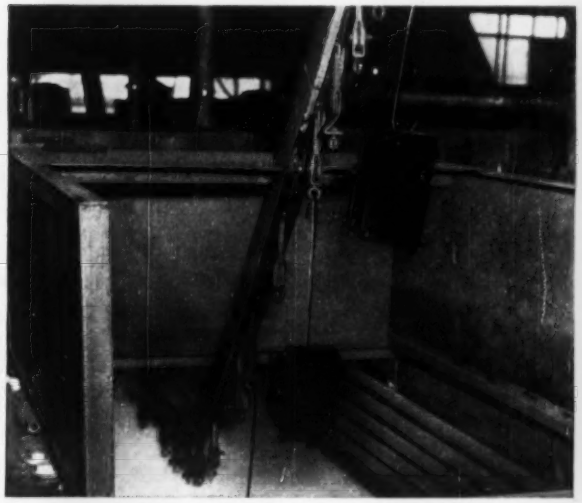
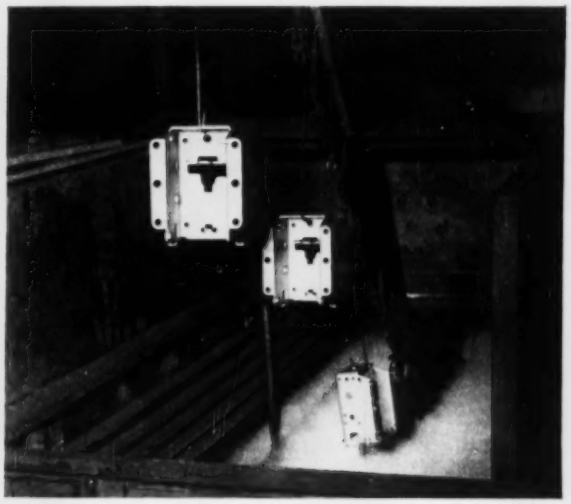
H-VW-M

INDUSTRY'S WORKSHOP FOR THE FINEST IN PLATING AND POLISHING PROCESSES · EQUIPMENT · SUPPLIES

THE MODERN SOLVENT THAT FITS EVERY VAPOR DEGREASING NEED



GREASE-COVERED switch gear housings enter vapor degreasing unit by conveyor. A system such as this permits smooth, even flow of housings at high production speed.



CLEAN, WARM AND DRY—the housings emerge from the unit ready for inspection, assembly or further processing—in less than a minute.

DU PONT "TRICLENE" D

(TRICHLORETHYLENE)

cleans hard-to-reach surfaces in less than a minute

You can clean intricate metal parts easily and thoroughly with "Triclene" D. This rugged solvent goes after the heaviest contaminants . . . routs them from seemingly inaccessible places.

Stable and pure "Triclene" D has been carefully developed over the past twenty years—ever since Du Pont pioneered synthetic solvents for vapor degreasing. It is designed for efficient operation in all types of degreasing equipment . . . removes even the most stubborn of today's buffing and machining compounds. And its narrow boiling range simplifies solvent recovery for economical re-use.

DISTRICT OFFICES: Boston • Charlotte • Chicago • Cincinnati Cleveland • Detroit • El Monte (Calif.) • New York • Philadelphia

Du Pont metal cleaning specialists are experienced in keeping degreasing installations at peak efficiency. They will be glad to assist you in all phases of your metal cleaning program. For this friendly service, simply get in touch with your nearest Du Pont district office.

THIS VALUABLE INFORMATION IS YOURS—FREE

You'll find complete information on the operation and maintenance of vapor degreasing equipment in these booklets. And interesting up-to-date case histories about degreasing units in operation throughout the metal field are presented in our publication, "MODERN METAL FINISHING." You can receive this wealth of information by checking the appropriate boxes in the coupon below and returning it to us.

E. I. du Pont de Nemours & Co. (Inc.) MWY
Electrochemicals Dept., Wilmington 98, Del.

Please send me more information on vapor degreasing and "Triclene" D. I am interested in receiving the literature checked below.

- ☐ Free booklets on vapor degreasing
- ☐ Free publication "MODERN METAL FINISHING" (Please add my name to the mailing list)

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first in solvents for
VAPOR DEGREASING

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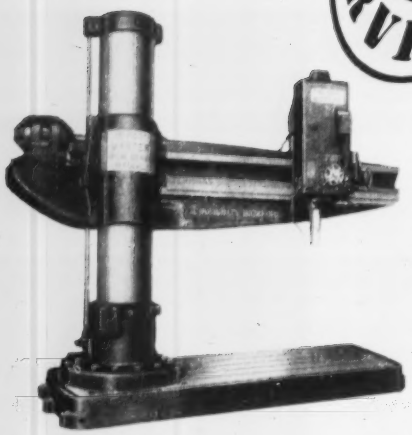
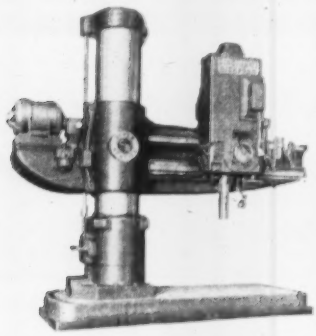
There's a SUPER SERVICE for your job...

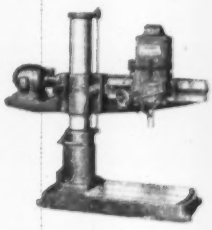
For greatest savings in drilling cost The Cincinnati Bickford Tool Company offers a complete line of 34 different sizes and types of drilling machines. One of these machines will cut your drilling costs. Our engineers will help you select the proper machine for your work. Write for bulletins on the machines that interest you.



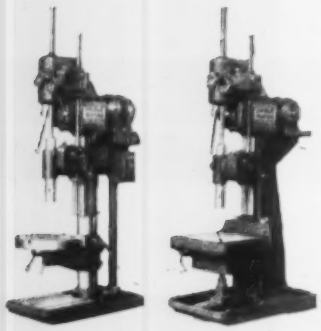
The SUPER SERVICE Master Radial Drill, as described in Circular R-22, is built in 7' to 12' arm lengths and in 22" and 26" diameter columns. This machine has 36 speeds and 18 feeds powered by motors from 20 to 40 HP.



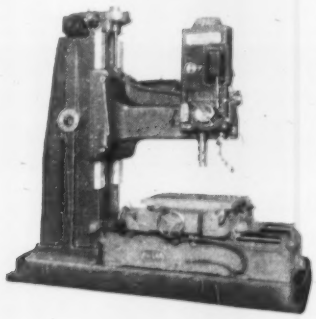
The 36-speed 18-feed SUPER SERVICE Radial Drill, as described in Booklet R-29, is furnished in 13 different standard sizes, ranging from 3' to 8' arm lengths and 11" to 19" diameter columns. These machines are furnished with 7½ to 20 HP driving motors.



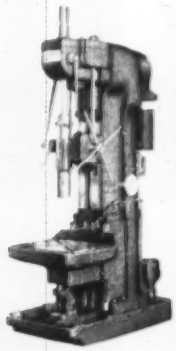
The 9" Diameter Column SUPER SERVICE Radial Drill, as described in Circular R-21C, is built in either a 3' or 4' arm length with 9 speeds and 4 feeds powered with a 3 HP driving motor.



The SUPER SERVICE General Purpose Upright Drilling Machines, as described in Booklet U-25, are furnished in 21", 24" and 28" sizes. From 8 to 12 speeds and 4 to 9 feeds. The machines are powered by either 3, 5 or 7½ HP motors.



The new SUPER SERVICE Precision Drilling Machine is especially suited to operations in conjunction with an automatic spacing table. This 36-speed 18-feed 15 HP motor machine is more completely described in Circular FH.



The SUPER SERVICE High Production Manufacturing Type Uprights have many of the advantages of the general purpose drilling machines but, due to their simplified construction, they are much more economical. They are furnished in 21", 24" and 28" sizes with 3, 5, 7½ or 10 HP driving motors. Booklet U-27 will furnish you more complete details.

CINCINNATI BICKFORD

RADIAL AND UPRIGHT DRILLING MACHINES

THE CINCINNATI BICKFORD TOOL CO.

Cincinnati 9, Ohio, U.S.A.

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Extra toughness for your heaviest shock loadings, extra wearability to slash your maintenance costs, and extra fatigue life to give you longer uninterrupted service! These extra values in every length of Atlas Roller Chain are pre-tested daily on the Atlas Metallograph, for proven performance year after year on your power transmission drives.

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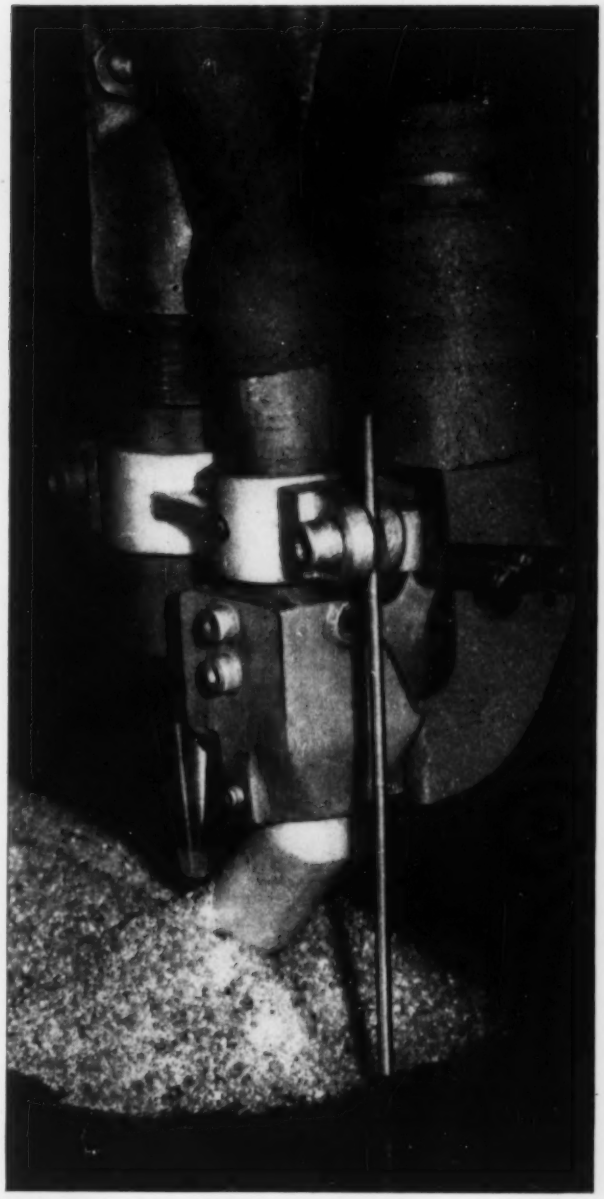

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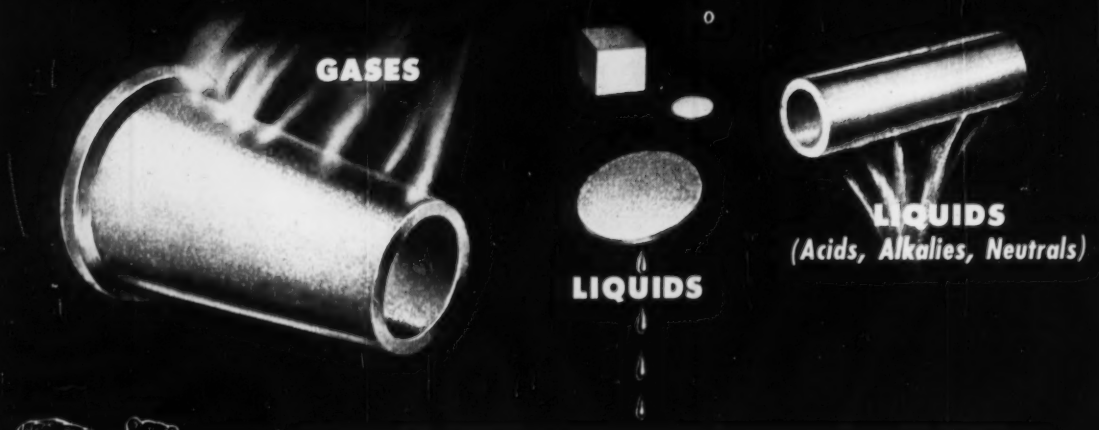

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B&L Cold Finished LEDLOY Bars are available in Grades "A" and "B" (low carbon, high sulphur), as well as other plain carbon grades and certain alloy steels.

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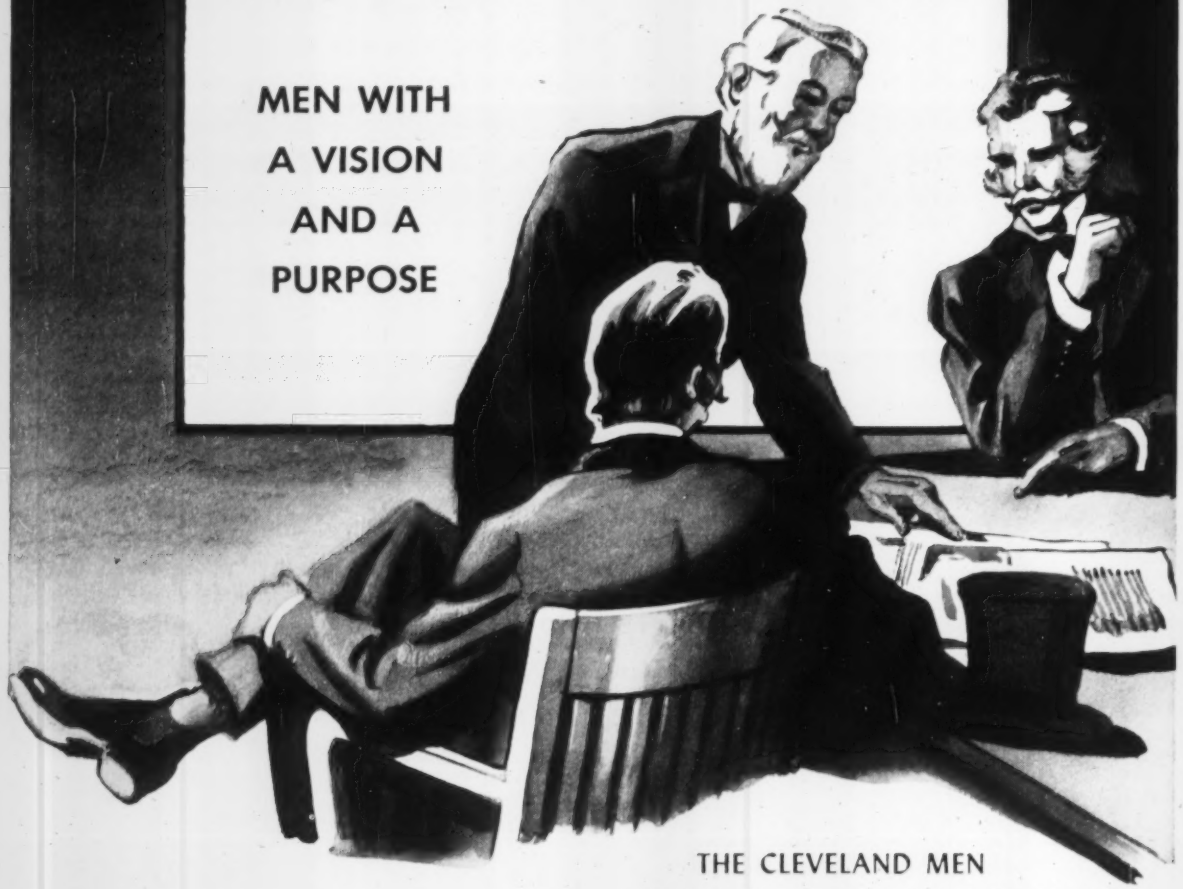
A VISION
AND A
PURPOSE



THE CLEVELAND MEN

Under authority of a special act of the Michigan legislature, on December 26, 1850 "The Cleveland Men" met at the old Canal Bank in Cleveland, Ohio to form The Cleveland Iron Mining Company. From this beginning grew The Cleveland-Cliffs Iron Company. This pioneering undertaking was one of the initial steps in the founding of the great Lake Superior iron ore industry.

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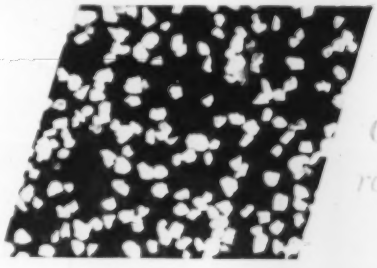
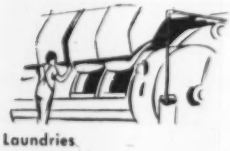


. . . another addition to General Chemical's wide range of Sodium Compounds

Uses: Bottle-washing plants



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Metal Cleaners

Heavy Duty mechanical dish-washers

Cleaning industrial equipment

In the textile industry

Water treatment to prevent corrosion

General Chemical's hydrated Sodium Metasilicate has long been recognized in the field of heavy duty detergents as a quality product, particularly suited to applications requiring an alkaline detergent which is extremely effective without being unduly corrosive.

General's new Anhydrous Metasilicate, like the hydrated product, is of exceptionally high quality. Behind it stands all of the experience the company has gained in half a century as a leading producer of Sodium Compounds.

It is produced as a free-flowing, white, granular material; screen size—all through 10 mesh, 1% maximum through 100 mesh. It is packed in 100 and 400 pound drums, and 100 pound bags.

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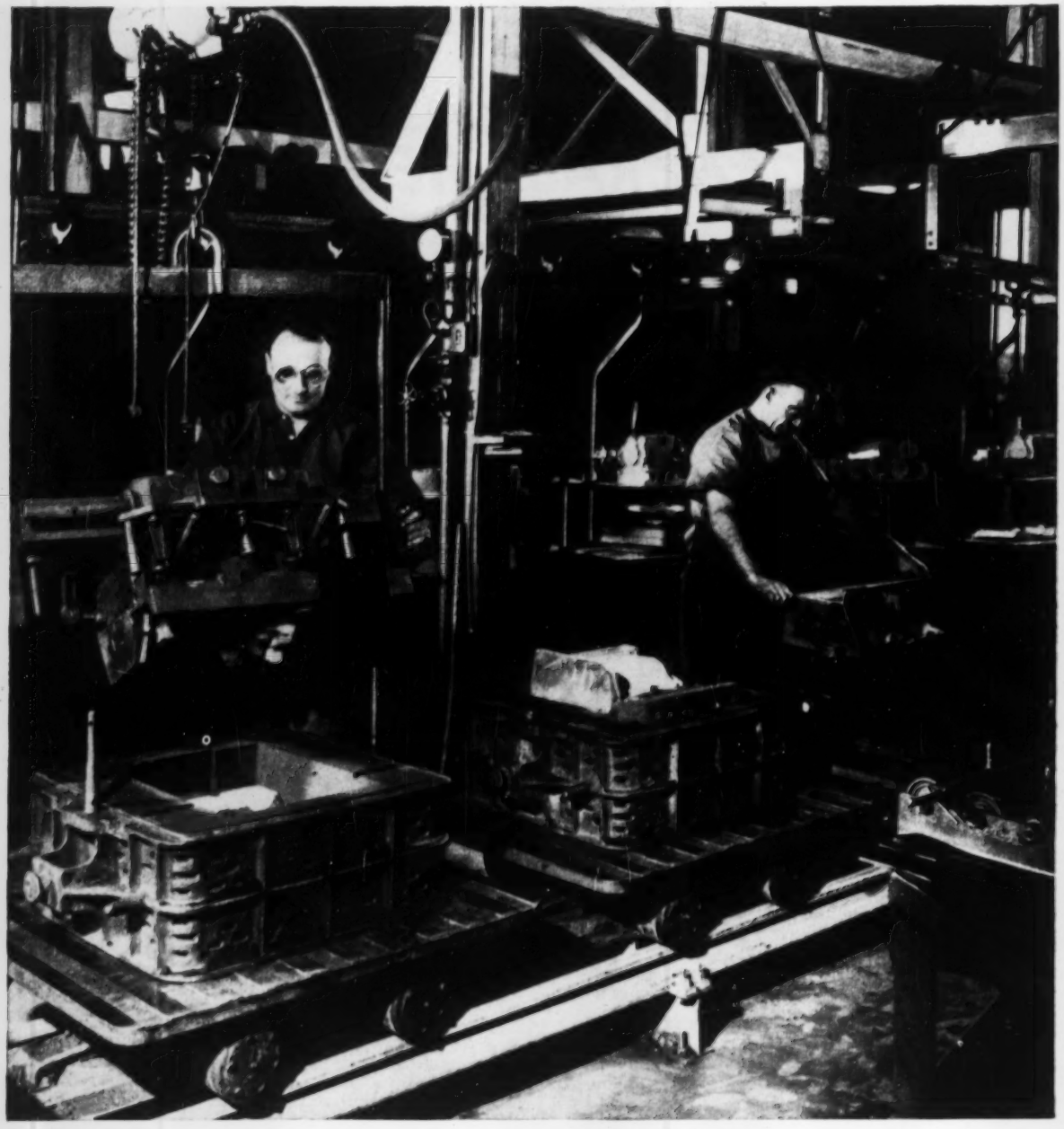

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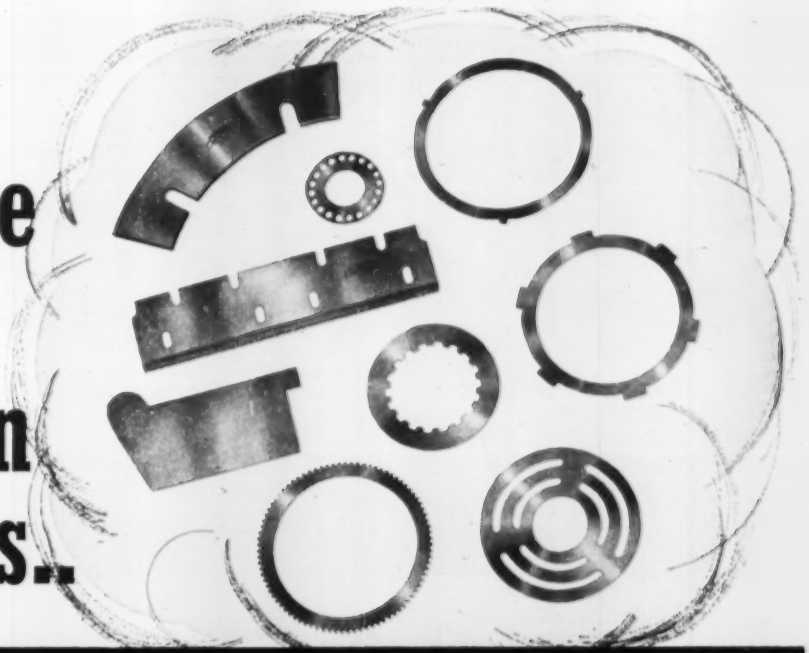
Basic Layouts — Equipment Installation Designs — Production Analyses — Equipment Design and Specifications — Purchase Recommendations — Fume, Smoke and Dust Control — Architecture — Process Piping — Power Distribution — Heating and Ventilating — Specifications and Contracts

GIFFELS & VALLET, INC.
INDUSTRIAL ENGINEERING DIVISION
1000 MARQUETTE BUILDING, DETROIT

If Parts Like These are Production Headaches..



then make SIMONDS Special Parts Division part of your own production line!

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If you're having difficulty manufacturing (or obtaining) any *FLAT STEEL PARTS* . . . especially parts that require heat treating and grinding . . . then here's your headache powder

Simonds Special Parts Division can be your production line for these parts . . . raw steel from Simonds Steel Mill in Lockport, N. Y., fabricated into your part at Simonds Famous Windowless Plant in Fitchburg, Mass.

Simonds Special Parts Division is fully equipped to produce precision parts for aircraft engines, printing presses, slitting machines, air compressors and numerous other applications. Clutch discs for coal handling equipment, machine tools, marine transmissions, etc., is another Special Parts Division item. Send your inquiries, with full specifications or blueprints, direct to Simonds Special Parts Division, Fitchburg, Massachusetts.

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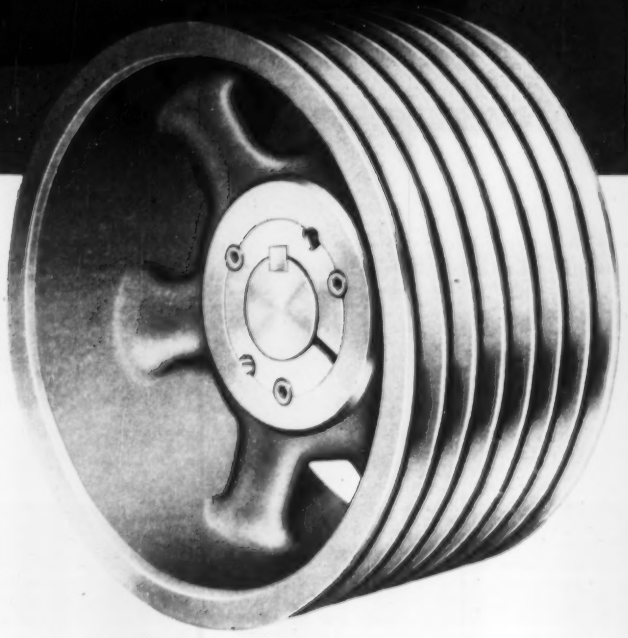
There's only ONE TAPER-LOCK



TAPER-LOCK sheaves run true! The patented Taper-Lock bushing grips the shaft for the full length of the bushing—holds with the firmness of a shrunk-on fit!

Every belt pulls its full share of the load. Grooves, machined on precision equipment, have identical pitch diameters, assuring equal belt tension.

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Taper-Lock sheaves are available from distributors' stocks in complete range of sizes in A, B, C and D grooves.

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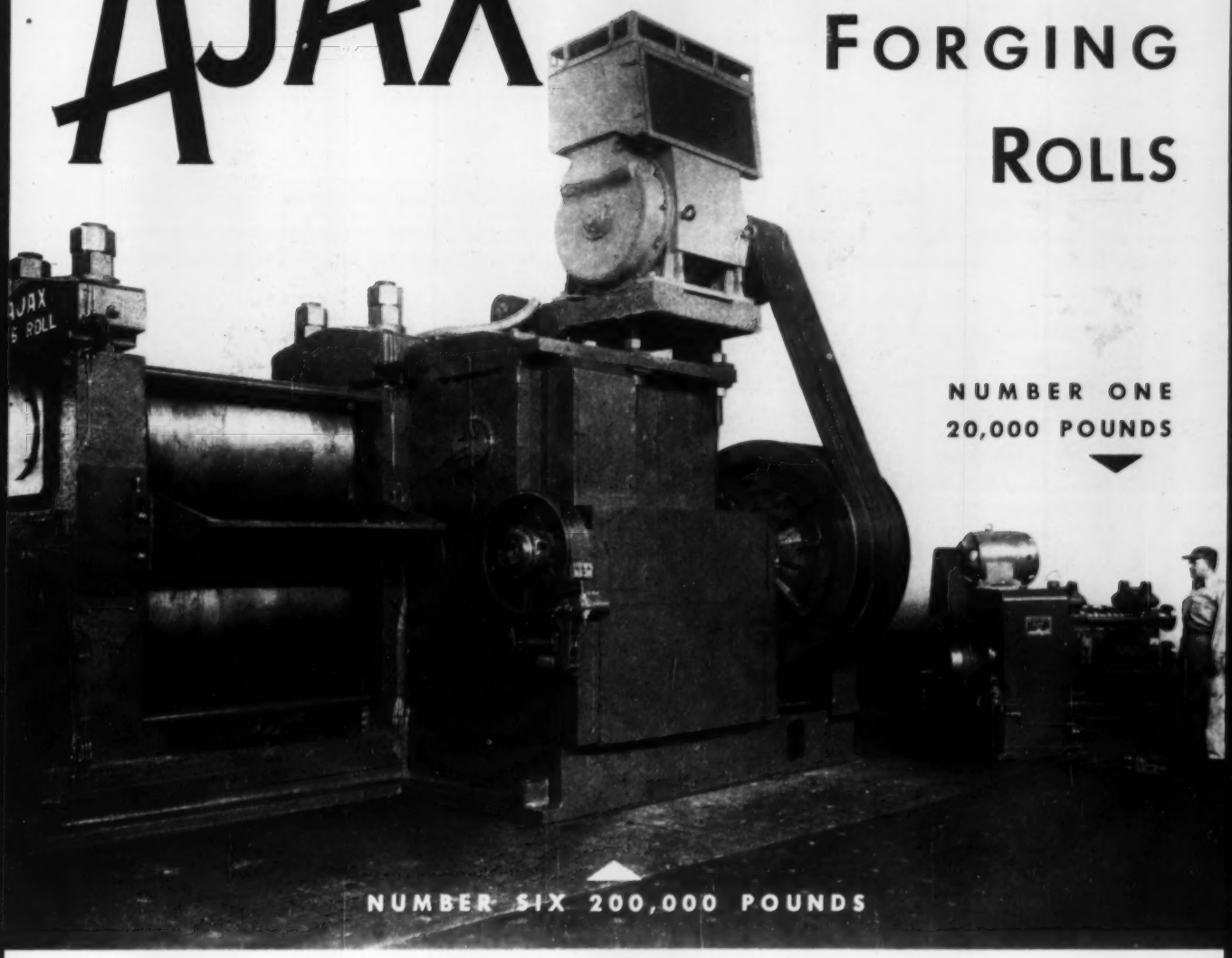

NUMBER SIX specifically used for forging aircraft components. 200,000 pound AJAX FORGING ROLL shown at the left and foreground above is designed for pre-rolling blanks for subsequent DROP forgings.

NUMBER ONE universally used in aircraft, automotive, agricultural industries. 20,000 pound AJAX FORGING ROLL shown at the right above is designed for rolling reduced tapered and straight forgings and pre-rolling blanks for subsequent PRESS forgings.

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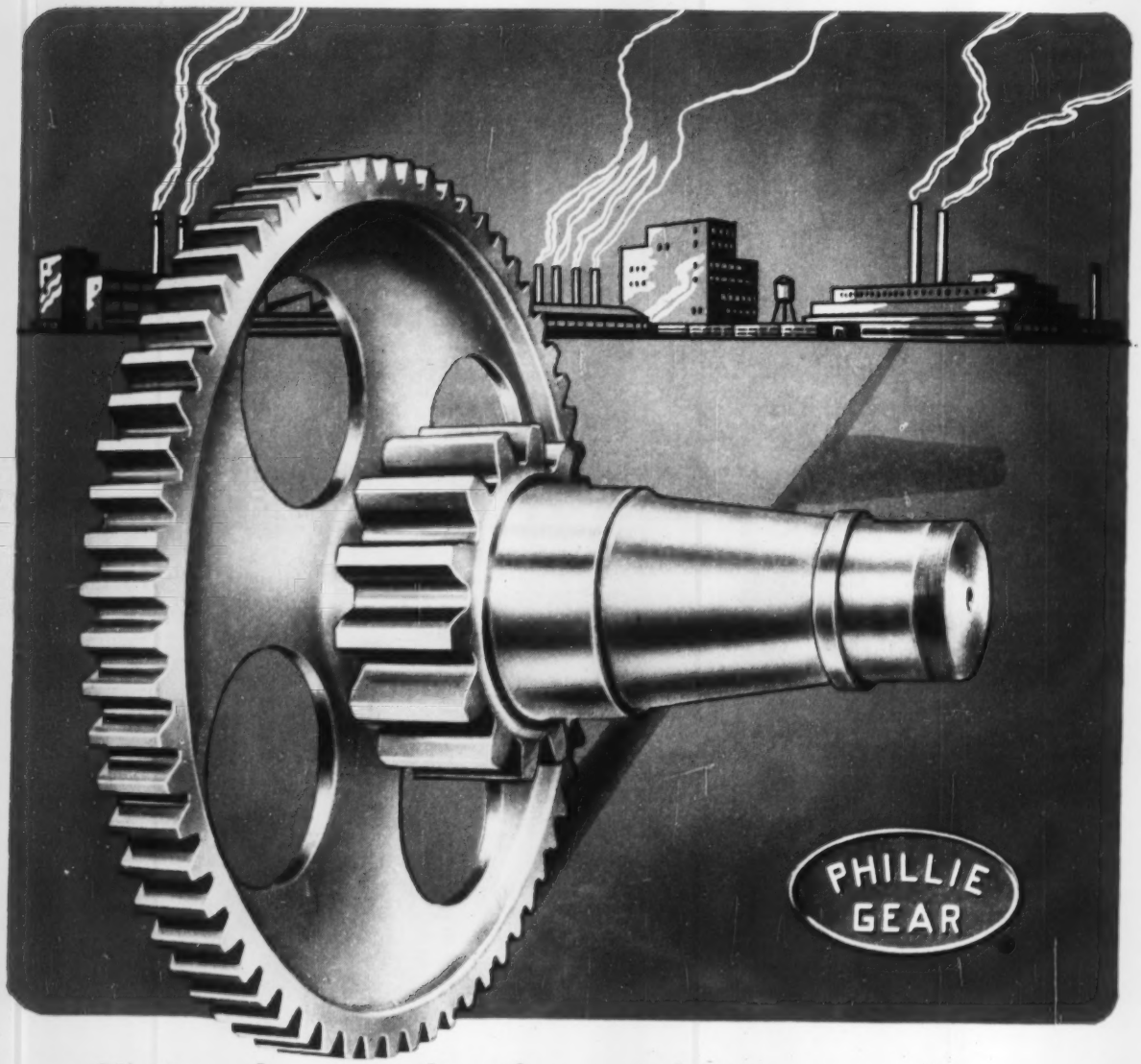

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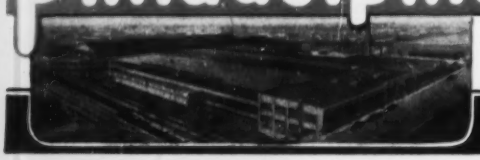
Philadelphia Gear Works, INC.



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For positive bearing protection

THEW-LORAIN *specifies*

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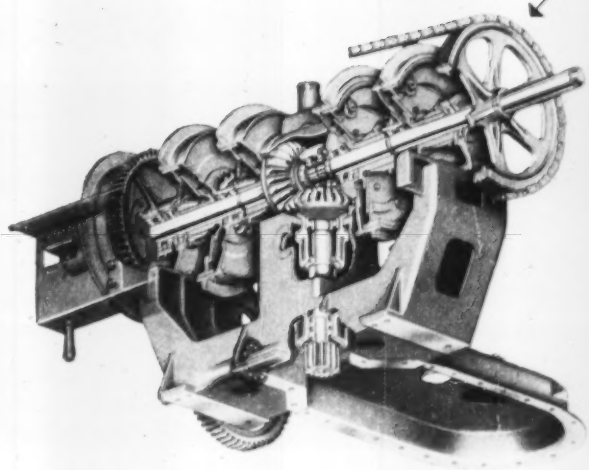

At the left is a cut-away illustration showing the "heart" of Thew-Lorain's "TL" Series of power cranes and shovels—the clutch shaft bevel gears which operate the turntable of Lorain TL-25's. Dependable KLOZURES protect 5 of the clutch shaft bearings under the most rugged service conditions where operating temperatures often exceed 250° F.

MODEL 53 KLOZURE

MODEL 51 KLOZURE

Cross-sectional views of finger-spring KLOZURES; hycar sealing element for normal services—silicone rubber sealing element for elevated temperatures.

Thew-Lorain power shovels and cranes must withstand rugged operating conditions—where dust, dirt, and moisture are the rule rather than the exception. That's why TL engineers specify dependable KLOZURE Oil Seals for the inner clutch assembly (illustrated) and many other bearing applications. These superior oil seals give maximum bearing protection by keeping the lubricant *in*, dirt and moisture *out*.

Prolong the life of your bearings! Standardize on Garlock KLOZURES and prevent breakdowns and resulting losses in production.

KLOZURE Oil Seals are made in a complete range of sizes and in many models. For full information call your Garlock representative or write for KLOZURE Catalog No. 10.

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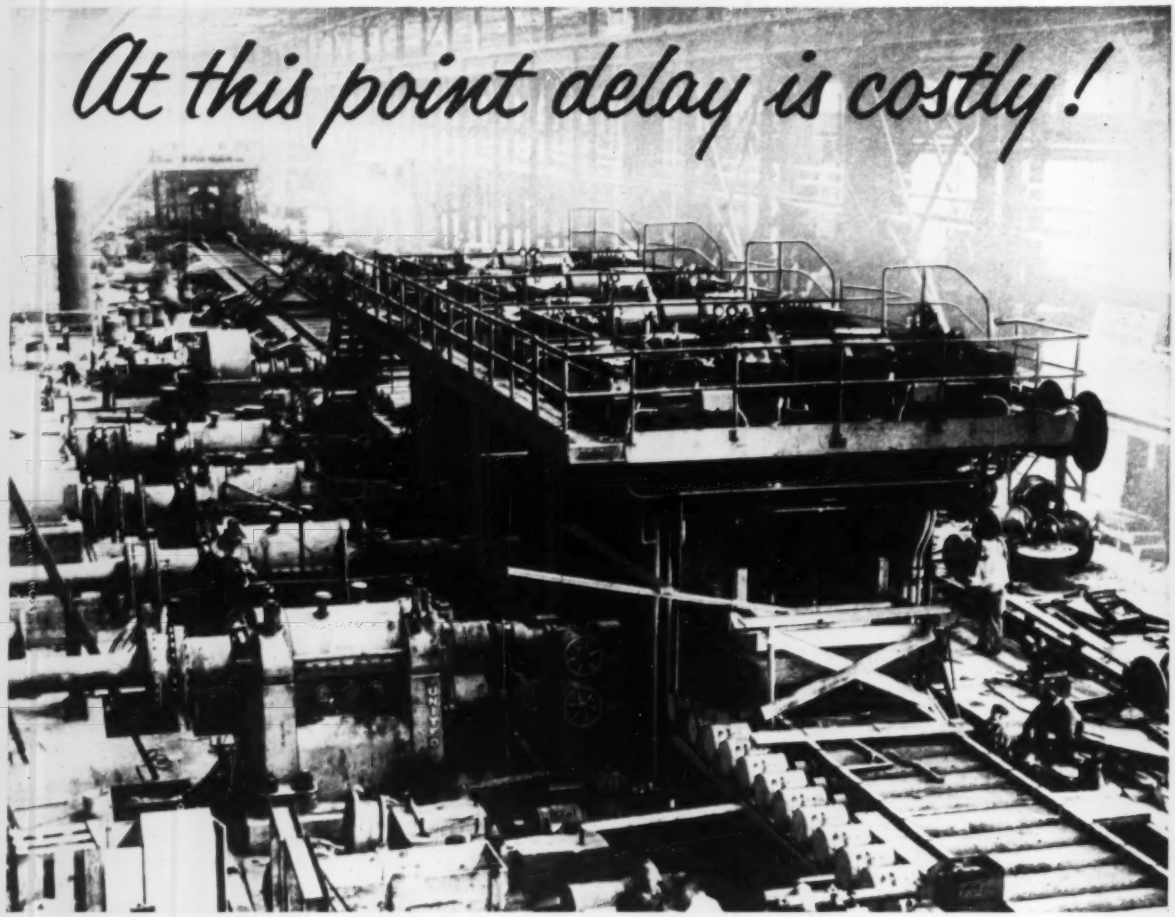

Pittsburgh Steel Company's new hot mill at Allenport, Pa., during installation

THE FINEST steel mill equipment becomes a real asset only after it is properly installed and in operation.

The machinery pictured above is typical. Until actual production of finished sheets began, the 28 millions of dollars required to complete this facility earned not one penny.

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Specialists in all types of industrial construction and machinery installation, CCC has built an enviable reputation for doing quality work quickly and economically.

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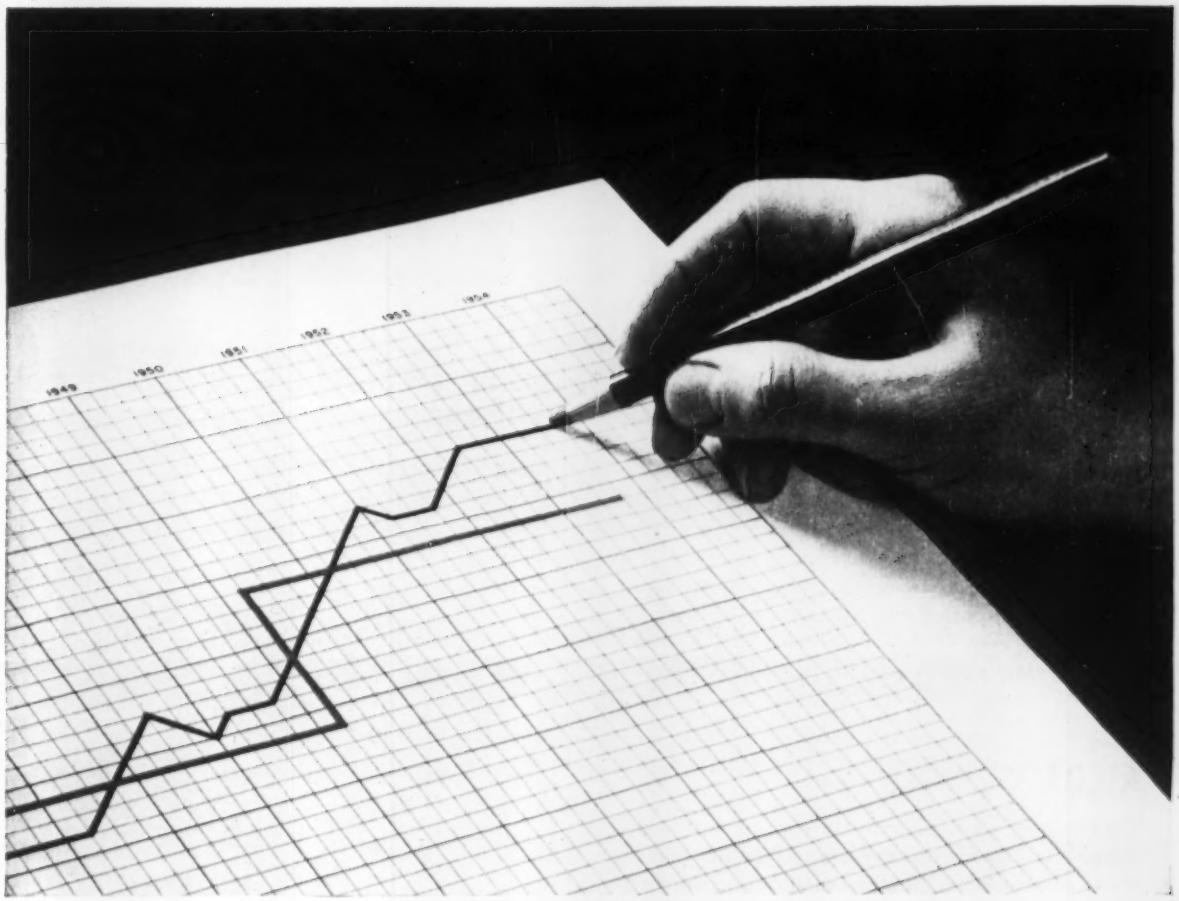

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Keeping your fire protection properly balanced with changes in processes as well as ups and downs in production is vital to efficient, profitable operation.

You'll find your best answer to this serious fire problem which is currently confronting industry by installing an expansible, fully approved C-O-TWO Low Pressure Carbon Dioxide Type Fire Extinguishing System. Simple piping, running from one centrally located storage tank, instantly transports clean, non-damaging, non-conducting carbon dioxide anywhere in the plant area. Fire at any protected location is extinguished in seconds with an absolute minimum of expense and interruption.

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Flexibility is the keynote . . . the low pressure carbon dioxide storage tanks range in capacity from one to fifty tons . . . discharge facilities can be either manual mechanical, manual electric, automatic mechanical, automatic electric or a combination of these . . . especially installed to fit your particular needs.

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Squeez-Grip Carbon Dioxide Type Fire Extinguishers
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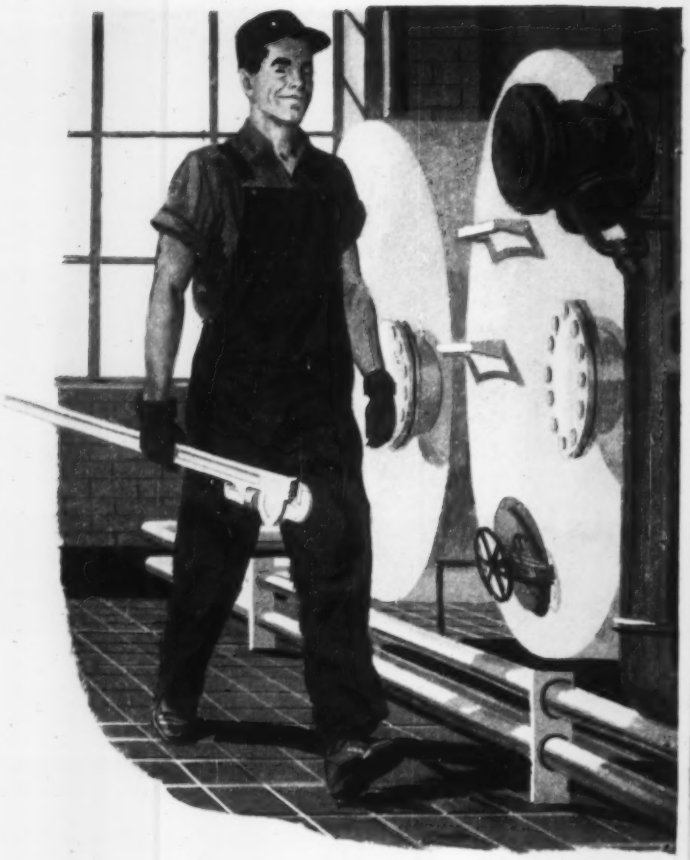
ALUMINUM IS *Why* THIS WRENCH MAKES ONE POUND WORK LIKE TWO



Because forged aluminum takes the place of malleable iron or steel in the handle, hook and housing, this new "LITE-MITE" pipe wrench weighs only half as much as an ordinary heavy-duty wrench. Easier to carry and to use, it cuts down on worker fatigue and increases productivity.

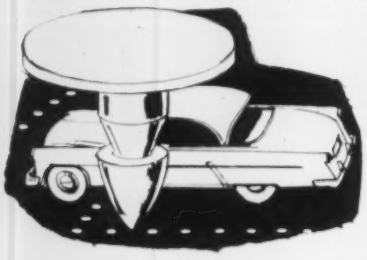
Yet there's no sacrifice of trength in the effort to reduce weight. Every size, from 10 inch to 36 inch, exceeds U. S. Government specifications for heavy-duty wrenches by 20 per cent or more.

ALCOA IS *How*

Thirty-one years of experience operating the nation's largest aluminum forging facilities backed Alcoa's recommendation on the alloy and the forging technique best suited to this application. If the lightness of aluminum combined with the strength and durability of forging can help improve your product, complete and authoritative counsel is yours for the asking. Call your local Alcoa sales office or write: Aluminum Company of America, 877-A Alcoa Building, Pittsburgh 19, Pennsylvania.

Alcoa Aluminum

ALUMINUM COMPANY OF AMERICA

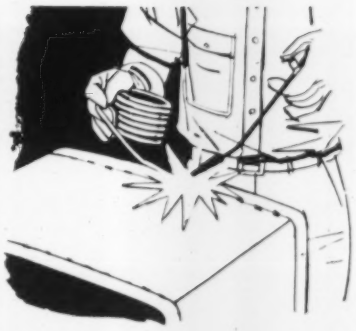


TRAFFIC MARKERS, forged of aluminum, are designed to be driven into asphalt pavements. Besides strength, they offer permanent, corrosion-free brightness—a major advantage in combating death and injury due to traffic accidents.

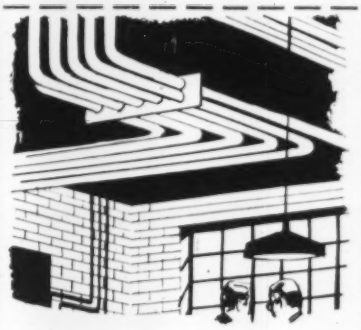
LIGHT WEIGHT is combined with high strength in this forged aluminum spray-gun handle. Lightness means less fatigue for operators. Durability keeps them on the job when subjected to abuse that would fracture any less durable material.

DISC WHEELS, forged of aluminum by Alcoa, weigh 30 to 50 pounds less than their steel counterparts. Resultant savings in unsprung weight means extra payload for truckers. Almost 50,000 Alcoa® Aluminum Forged Disc Wheels are proving their worth all over the country.

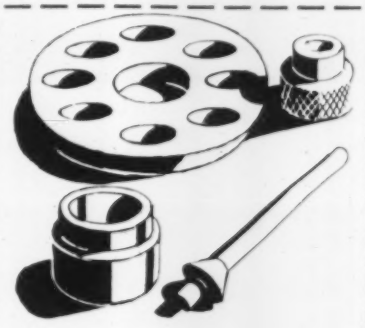
ALCOA ALUMINUM DIE CASTINGS can weigh one third as much as heavy metal castings, yet provide great strength. They are exceptionally easy to machine . . . take all finishes . . . often cost less.



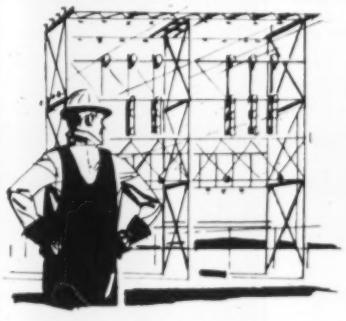
***FILLER METAL** of Alcoa Aluminum is available in many alloys for use in brazing, torch welding and arc welding. It is also packed suitably for automatic welding operations.



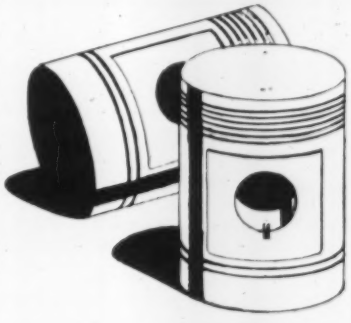
***RIGID CONDUIT** of Alcoa Aluminum is the lowest cost corrosion-resistant, metallic conduit available. Its nonmagnetic properties improve electrical efficiency—its light weight speeds installation.



SCREW MACHINE PRODUCTS made of Alcoa Aluminum are light, lustrous and low cost. Alcoa's Edgewater Plant is a screw machine job shop, turning out all types of fittings, special fasteners, etc., to customer specification.



***SUBSTATIONS** built of lightweight Alcoa Aluminum Structural Rolled Shapes are quickly fabricated and erected. Aluminum's corrosion resistance eliminates current shut-downs for maintenance painting.



GIANT PISTONS and bearings weighing up to 800 pounds are cast of aluminum in permanent molds at Alcoa foundries! Tolerances and surface finish are exceptional.

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Hinkle Supply Co.

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COLORADO
Denver
Metal Goods Corp.

CONNECTICUT
Milford
Edgcomb Steel of New England, Inc.

FLORIDA
Hialeah
Florida Metals, Inc.
Jacksonville
Florida Metals, Inc.
Tampa
Florida Metals, Inc.

GEORGIA
Atlanta
J. M. Tull Metal & Supply Co., Inc.

ILLINOIS
Chicago
Central Steel & Wire Co.
Steel Sales Corp.

INDIANA
Indianapolis
Steel Sales Company of Indiana, Inc.

LOUISIANA
New Orleans
Metal Goods Corp.

MARYLAND
Baltimore
Whitehead Metal Products Co., Inc.

MASSACHUSETTS
Boston
Edgcomb Steel of New England, Inc.
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Whitehead Metal Products Co., Inc.

MICHIGAN
Detroit
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MISSOURI
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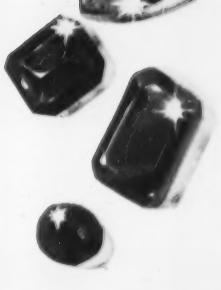
35,000 TON FORGING PRESS

A NEW 35,000 ton hydraulic forging press being built by UNITED for the USAF Heavy Press Expansion Program to help bring the United States to a commanding position in the production of modern aircraft for the armed services.



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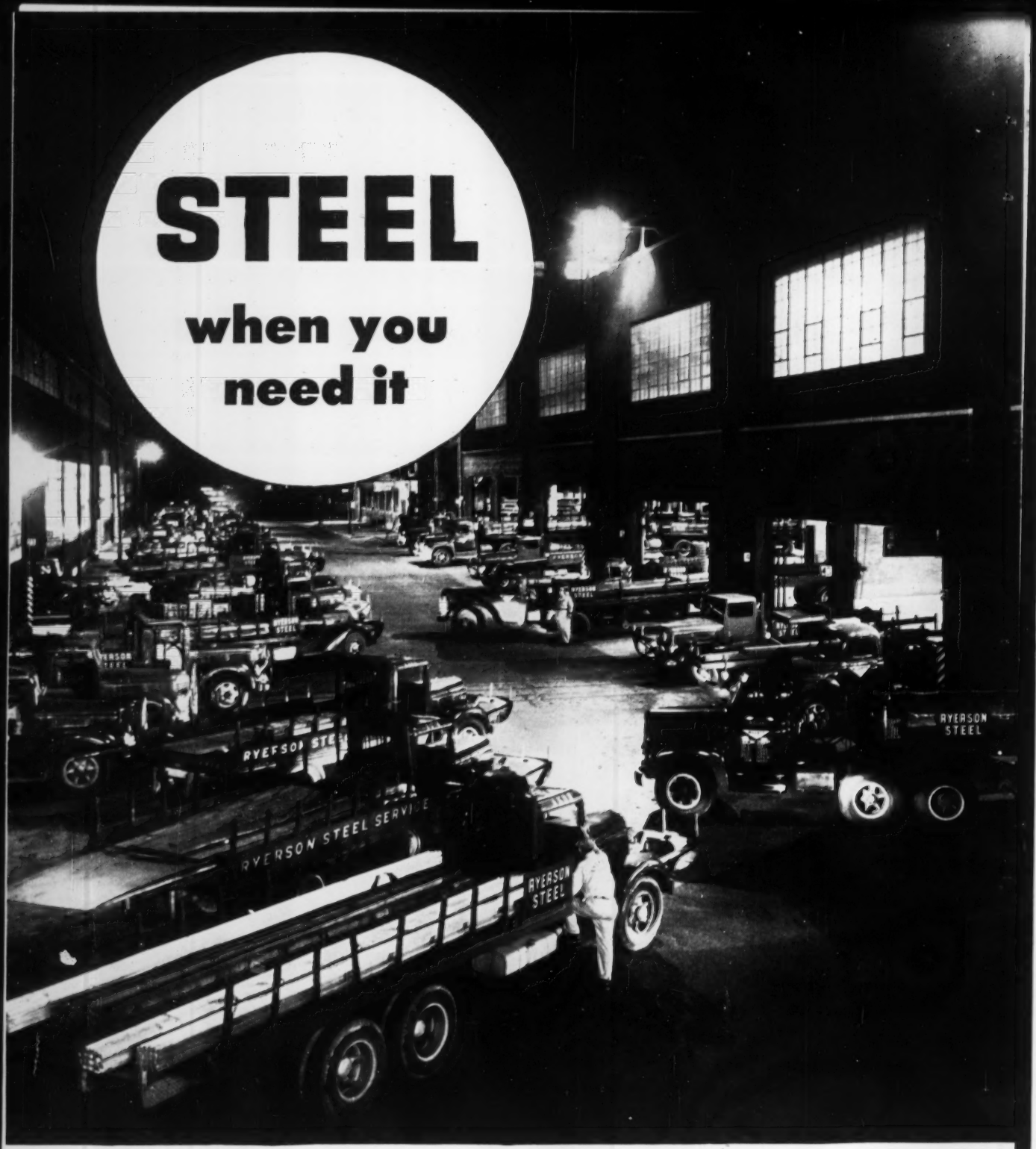

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STEEL

January 4, 1954

Metalworking Outlook

Business Weather for 1954

The economic weather forecast for 1954: Fair and warm, but not as sunny as in 1953. Business barometers clearly show that we're starting on the downside, after last year's peak, of the boomiest boom in U. S. history. But 1954 will still be excellent, perhaps second only to 1953. Sales of metalworking products may hit $122-$124 billion during the next 12 months, compared to $126.6 billion in the past year. Gross national product (value of all goods and services) will also drop about 2 per cent to $360 billion in 1954, compared to $367.5 billion in 1952. The Federal Reserve Board's industrial production index, calculated on the new 1947-1949 base, should average about 130 in 1954, compared to 134 in 1953.

People Don't Act Like Statistics

Last year's performance is accounted for partly by an inventory build-up that didn't slacken until the fourth quarter. No such development is likely in 1954, unless there's all out war or a serious strike. In fact, watch for moderate declines in stocks, especially because prices will be generally stable. The inventory factor, the return to competition, the end of nearly all shortages and the decline, even though slight, already turning up in most statistical indicators could have a depressant effect on the most important and the most intangible of business-determining elements, the psychology of people. But it hasn't. A STEEL survey (p. 117) directed to more than 5000 metalworking executives shows they foresee a mere 2 per cent drop in 1954.

The Probabilities

Their optimism is based on such probabilities as these: Defense spending will remain at about $50 billion, the same as in 1953. Disposable personal income will hit $236 billion in 1954, down 5 per cent from the $248.5 billion of 1953, but it would still be above the $234 billion for 1952. New plant and equipment expenditures will reach $26 billion, down only 6 per cent from the $27.8 billion for 1953 and nearly matching the 1952 performance. Even steel ingot output will approximate 95-100 million tons, compared to 112.3 million in 1953. That's down more than some other types of production because of unusually high inventory accumulation in 1953.

Industry-by-Industry Prospects

Steel-consuming industries will fare about this way:

CONSTRUCTION—The prospects are surprisingly good—a total $34 billion volume in 1954, compared to $34.7 billion in 1953. Home building in the next 12 months is estimated at about 975,000 units, compared to slightly more than 1 million in 1953, but home improvement expenditures will

The Market Outlook—p. 491

jump as much as 20 per cent. Industrial building will amount to $2 billion, compared to $2.3 billion in 1953. Private commercial building, institutional construction and public projects will all increase.

AUTOMOBILES—Look for about 5.5 million U. S. cars to be built, some 10 per cent fewer than were assembled in 1953. About 1 million trucks will be turned out. The first quarter will be the best of the year. An estimated 3.2 million cars will be built in the first half.

APPLIANCES—Total units sales will be off 5 to 10 per cent from 1953, but active items like room air conditioners will surpass last year's totals. The big bulge in appliance production will not come until the late 1950s when the large replacement market for 1946-1948 sales indicates new record production.

MACHINERY—Industrial machinery sales are over the hump, but the demand in the next 12 months will still be within 4 or 5 per cent of 1953. Machine tool builders see no substantial drop in 1954 from the $1.2-billion volume last year.

ELECTRICAL EQUIPMENT—Production will continue high primarily because of big orders for generating equipment. Electronic apparatus sales will also reach new highs. Best customer for the industry will probably be the military in 1954. Defenses took $2.7 billion to $3 billion worth of electrical equipment in 1953.

FARM EQUIPMENT—Sales won't go much lower. Next year may see a slight improvement, but the 1954 total still won't come anywhere near peak years. Sales reached $2.2 billion in 1951. Everything in this field depends on farmers' prosperity.

CONTAINERS—This category will follow the steel market closely. Next year will be a good period. A lot of growth is still possible. Frozen foods may go in cans which offer better shipping insurance than plastic bags or paper. Look for more canned soft drinks.

RAILROADS—The bulk carriers are in poor financial shape but will still spend $1 billion for equipment in 1954, compared with $1.2 billion in 1953 and $1.3 billion in 1952. Big problem is the interchange of equipment which holds back investment in new rolling stock.

AIRCRAFT—The 60,000 suppliers in this field will have another excellent year, both from civilian and military sources.

SHIPBUILDING—The prospects are terrible.

OIL AND GAS EQUIPMENT—Look for another good year, but 1954 will not quite match the 1953 performance when the gas industry alone spent $1.7 billion on new plant and equipment.

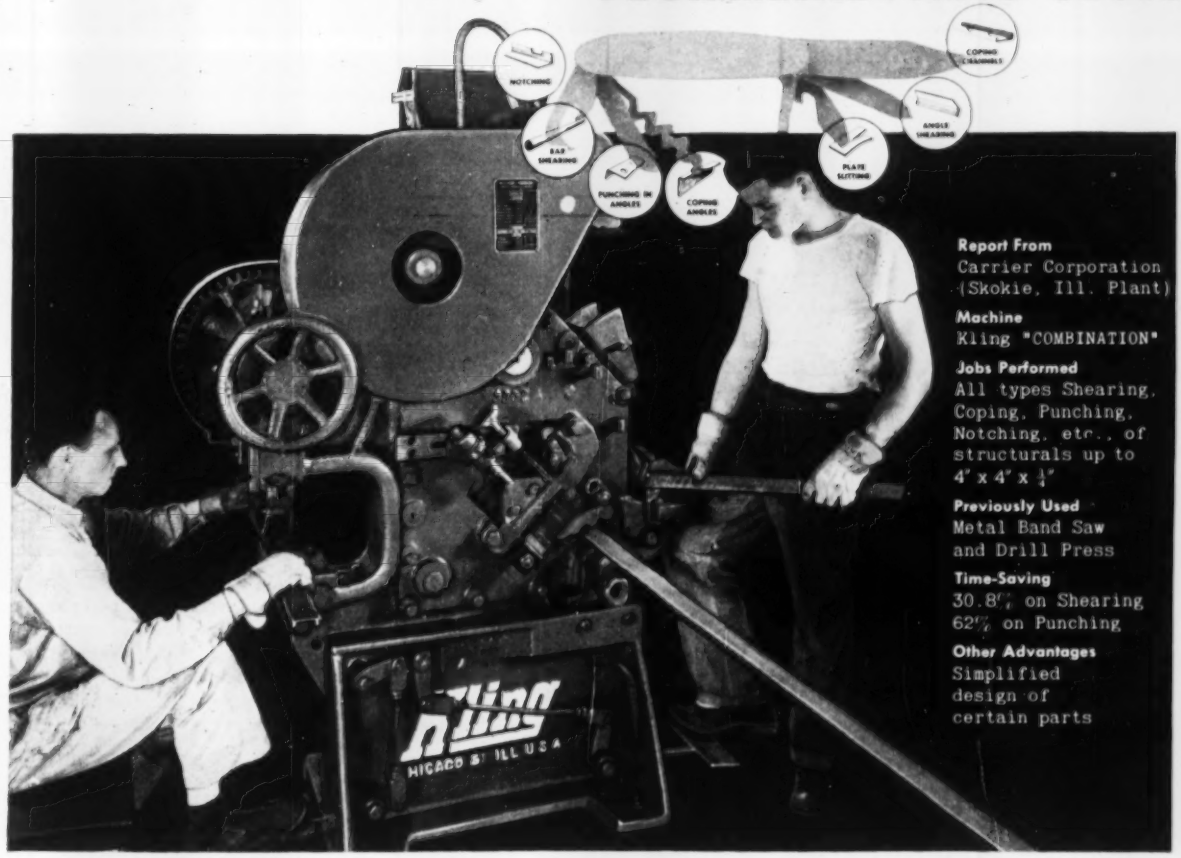
EXPORTS—Look for the doldrums to continue. Exchange is against us. Competition from Europe is stronger than ever.

IMPORTS—Incoming shipments of foreign steel will drop. Imports of certain finished industrial goods will increase. Europe is competing increasingly in Canadian and South American markets.

You, too, can

"WHITTLE DOWN"

YOUR METAL PARTS' COSTS



Report From
Carrier Corporation
(Skokie, Ill. Plant)

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Kling "COMBINATION"

Jobs Performed
All types Shearing, Coping, Punching, Notching, etc., of structurals up to 4" x 4" x ¼"

Previously Used
Metal Band Saw and Drill Press

Time-Saving
30.8% on Shearing
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Other Advantages
Simplified design of certain parts

the Kling COMBINATION SHEAR-PUNCH-COPER

is the "jack-of-all-jobs" **IN THE "BEST OF COMPANIES!"***

It's as all-round useful as your boyhood jackknife. For example at least eight different operations are performed by this Kling Combination Machine, in one of the plants of a nationally famous manufacturer of air-conditioning equipment, according to their report. In addition to time-savings of 30.8 to 62%, this "all-round" machine makes possible much simpler designing of important parts. For maximum speed and safety, each end operates independently. Available in 3 sizes, for light, medium and heavy work. Ruggedly built for dependable performance over many years of multiple service.

** The following are some of the companies using Kling Machines:*
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Bethlehem Steel Co. Inc. Carrier Corporation Grand Iron Works Inc.
Commercial Tank and Welding Co. L. B. Foster Co. Kyle and Co.
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For detailed description of the Kling "Combination" and all the jobs it can handle, send for new Bulletin 347.

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Since 1892 Kling ***...an investment in speed!***

Ingersoll-Rand uses Nickel Alloy Steel Gears

A size 20 Ingersoll-Rand Multi-vane close-quarter drill reaming a one inch hole in a machine bed plate casting. Extremely close quarter operations on much of today's modern machinery has created a demand for powerful tools capable of getting into narrow corners for such operations as drilling and reaming of holes. And it poses the problem of getting gears which are small enough for the job, yet tough enough to transmit high torques. Ingersoll-Rand Company engineers specified a nickel alloy steel for the bevel gears and pinions in that company's pneumatically operated close-quarter drills.

For Increased Strength . . . Heavier Loads . . . Longer Machine Life

Maximum wear resistance . . . greatest surface compressive strength . . . extremely tough cores that withstand shock loads as well as fatigue and bending stresses . . .

These are some of the properties you get in gears fabricated from *nickel alloy carburizing steels.*

Furthermore, distortion that accompanies heat treating . . . a chief cause of noisy gears . . . is inherently resisted by nickel alloy carburizing steels.

Direct hardening nickel alloy steels are used for gears carrying heavy tooth loading in applications where resistance to wear and surface compressive stresses is not quite so vital a factor. Here again, the nickel-containing steels develop the required strength more consistently and in heavier sections than carbon steels, and are generally more resistant to shock, fatigue and multi-axial stresses. Distortion resulting from heat treatment may be minimized by using nickel alloy steels. And, their machinability before final heat treatment is very good.

When you face revised stress analysis due to design changes . . . or changed fabricating methods that demand improved response to heat treating . . . remember that the many standard grades of nickel alloyed steels permit specifying the particular type which provides the best set of properties for any reasonable fabrication and service demands.

Investigate all the benefits nickel alloy steel gears can give you. Send us details of your problems for our suggestions.

INCO

THE INTERNATIONAL NICKEL COMPANY, INC. 67 WALL STREET NEW YORK 5, N.Y.

Our New Strength

On this fourth day of the new year, more people are looking forward to business prospects in 1954 with more confidence than they did six months or even three months ago. If there is a single phenomenon that has been more common than any other at the dawn of each new year since the end of World War II, it is that those who have attempted to predict the future usually started out with dire forebodings and gradually revised their estimates until at the last moment they approached optimism. Even at that, the tendency of the ablest economists has been to underestimate the nation's potential rather than to overestimate it.

We are reminded of these traits as we scan the prognostications for metalworking activity in 1954. There seems to be general agreement that production will ease moderately, employment will be off several per cent, manufacturing capacity will be up, and the buyers' market will accentuate competition, research and the improvement and introduction of products. In short, the opinion of more than 5000 metalworking executives interrogated by our editors is that 1954 will be the metalworking industry's second best year—yielding only to 1953.

To persons who went through the agonies of the early thirties, this optimism, coming on the heels of the war and inflation-stimulated boom from 1950 to date, seems incredible. Why is there such a great difference between the conditions prevailing immediately after the glamorous peaks of 1929 and 1953?

The answer lies in the advent in recent years of a new force in Americana that is difficult to define. Our youth, baffled by the muddled inheritance we left them, is raising larger families. Their incomes are larger than ours were, and their demands for comfortable living are greater. Industry, by virtue of tremendous advances in research and production efficiency, provides them with better household facilities at lower costs.

Somewhere along the line in the postwar years we in the United States have tapped a new source of economic strength. It is the dynamic force of new ambitions. Catering to it intelligently can be the most important factor in our nation's future.

E. L. Shaner

EDITOR-IN-CHIEF

TRADE ISSUE IS TOPS: Anybody in metalworking who contemplates what will transpire in 1954 is almost certain that foreign trade policy will be one of the most important topics for discussion among businessmen. Practically every industrial group or agency will be brought into the controversy. The question is to what extent our tariffs and our regulations affecting

foreign trade shall be modified in order to make it easier for foreign nations to increase their imports to us.

In one camp our experts say that already our restrictions are less objectionable than those of other nations. They argue convincingly that we should maintain a tariff barrier to protect our high-wage economy against that of low-wage foreign competition. This argument, while sound in many respects, raises the question as to whether or not our highly prized private enterprise system is as sound and invulnerable as we claim it to be.

* * *

OUR CHANGED STATUS: In connection with whatever policy we may develop in the new year in relation to foreign trade, it is well to remember that the historical considerations that for decades have made it somewhat easy for our politicians to favor a protective tariff have been altered substantially by the depletion of our nation's resources by the demands of the two world wars. Today we are dependent to a large extent upon dozens of foreign nations for important materials.

The mere fact that we need these raw materials in greater volume than heretofore is in itself an invitation to a more intelligent and a more realistic approach to our difficult problem of foreign trade. Why can't our experts in these matters develop a program that will work advantageously for those nations which have what we want and also to our nation which needs some of the things which they have in surplus?

* * *

ACCENT ON AUTOMATION: In this issue several hundred of the nation's outstanding authorities express their opinions as to where we are heading in technological advancement. Their statements, while pertaining to a great variety of methods and operations in many branches of metalworking, point emphatically to the fact that our American manufacturing system is definitely on the threshold of a new era in which the control of automatic operations in industrial production and distribution will assume major importance. While it is always difficult to predict what newly coined terminology will survive the attacks of industry's critics, we have a hunch that the word "automation" will figure prominently in the future abundant literature on this subject of increasing importance. It connotes a degree of automatic control that promises to further facilitate the production of more goods at less cost for more people.

* * *

'53 DOLLAR BUYS MORE: Possibly because of political ineptitude, the Eisenhower administration has taken a few blows on the chin that were not deserved. Much was said by the opposition press when the Eisenhower people had to ease off on its "hard money" policy because the results were too drastic.

However much we may deplore the fact that the Treasury had to back away somewhat from its originally avowed financial program, we should applaud one of its results. The much-criticized "hard money" policy did have a noticeable effect on the purchasing power of the dollar. On the basis of monthly averages as measured by wholesale prices (1947-1949 equals 100) a dollar bought 90.9 cents worth of goods in 1953 (p. 201) compared with 89.6 cents worth in 1952 and 87.1 cents in 1951. That the purchasing power has gained in two consecutive years, after the long period of sickening decline, is encouraging.

* * *

OUR SLUMS MUST GO: No person can dismiss the subject of the increasing influence of our newly formed families upon the economic future of the nation without considering the impact of several fundamental problems. First, of course, is the home, and it is rather significant that during 1953 the number of home owners exceeds the number of home renters for the first time in our history.

The tendency for more persons to own homes is likely to continue, but in metropolitan centers this ideal objective collides head-on with a problem of slum clearance that presents a headache of major proportions. American industry can well afford to exert more influence in support of municipal officials who will tackle this problem more vigorously and intelligently. The rotten cores of some of our great cities are not a good advertisement for a nation that boasts so much about the virtues of its system of free enterprise.

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WROT WASHERS

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Washers are stocked in thousands of different sizes, including all standard and semi-standard sizes. If your requirements cannot be met from this extensive inventory, more than 25,000 sets of dies are available to take care of special orders, or we will make up dies to meet your individual needs. *Write for Catalog "30" — 76 pages covering full line of washers, tool list for producing washers, helpful reference tables and other data.*

STAMPINGS

Large scale production facilities enable us to effect worthwhile savings, in many instances producing stampings more economically than possible in our customers' own plants. Our own tool and die-making shop enables us to make up dies necessary for producing new stampings, working directly from your blueprints.

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THE WORLD'S LARGEST PRODUCER OF WASHERS

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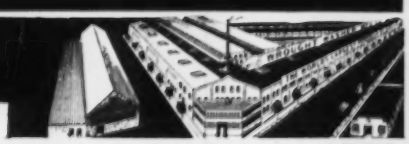

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Inland's unique size and location give customers a distinct advantage: **the opportunity for prompt and clear answers to your urgent problems.** Management, mill and sales people are close to each other. They can sit down face-to-face and work together to reach quick decisions affecting you.

INLAND STEEL COMPANY *38 South Dearborn Street • Chicago 3, Illinois*

SALES OFFICES: *Chicago, Milwaukee, St. Paul, Davenport, Kansas City, St. Louis, Indianapolis, Detroit, New York*

Compass for Competition

METALWORKING in 1953 chalked up another record year.

Manufacturers' sales of metal products topped $126 billion—nearly double the 1949 dollar volume and seven times the 1939 total.

Steel output rose to 112 million tons—7 million tons more than in the previous record year.

Gross national product climbed to $367 billion—$20 billion higher than the former peak.

National income was $305 billion—$14 billion above the prior high.

New plant and equipment expenditures were nearly $28 billion.

Electricity output rose to a weekly rate of 8.7 billion kilowatt-hours.

More persons, about 63 million, were at work at the highest wages ever paid.

But something more important than new production records happened in 1953. It was the year in which capacity caught up with demand. It was the year that ushered in the return to the buyer's market.

It was the year in which we achieved virtual freedom from government controls over prices, wages and materials.

It marked the end of a lush 13-year period in which the economy largely was stimulated by war and rearmament, by controls and inflation.

It was the year in which we returned to a free and competitive economy.

Competition Here To Stay

Barring war, it is likely we will continue in a strongly competitive economy.

The outlook for 1954 is excellent. Metalworking executives predict that dollar volume will be within 2 per cent of last year's record, even though prices continue level or edge slightly downward.

An upsurging population suggests that the economy will continue to expand vastly in the years and decades ahead.

But capacity also is greater. New capacity even now is being brought into production. Metalworking facilities will be enlarged by 12 per cent in 1954. Plans for even greater expansion in the latter fifties are in the making.

We are emerging from an era of shortages engendered by depression-born philosophies and

the demands of World War II. We have overcome our fear of over-expansion and productivity.

The larger capacity, extant and to come, and the freedom from artificial restraints and controls presage plenty of goods to meet whatever demand develops. That we again shall be caught short of adequate capacity is improbable, unless we are caught up in a world conflagration.

High-Level Economy

Not only will capacity increase but the total production of goods and services is due for a vast expansion.

That expansion likely will be faster and greater than most people can envision. Our national weakness in recent years has been to refuse to recognize the tremendous potentialities of our nation and our economy.

Three years ago, in the 1951 Metalworking Yearbook, the editors of this magazine predicted that metalworking sales would reach $120 billion by 1960. The prediction was considered daring by many. Some even termed it fanciful.

But we achieved the predicted growth in three years instead of ten.

We can err as greviously by setting our sights too low as we can by setting them too high.

How high is metalworking production likely to go in the years ahead?

Babies Bring Business

Our economy is based on people and we are getting more people all the time. A continuation of our present population growth indicates we will have 180 million population by 1960 and 200 million by 1975. What will this mean in terms of metalworking sales?

Let's tuck our tongues in cheek and embark on a little whimsical calculation.

Last year the per capita expenditures for the products of metalworking were about $788, based on $126.6 billion sales and 160 million population.

In 1947, per capita expenditures for metalworking products were $470 in terms of 1953 dollars. The average annual gain in constant dollars over the seven-year period was more than $45.

If we assume this rate of increase will continue to 1960, the per capita expenditures for metalworking products then would be $1103 and total metalworking sales would be $198 billion.

If we carry the projection to 1975, per capita expenditures for metalworking products would be $1778 and total metalworking sales would be $355 billion, still in terms of constant 1953 dollars.

Do these figures appear fantastic? If they do, take a look at what has happened to total metalworking sales since 1939 when they were $17.6 billion. This growth represents a threefold increase in constant dollars in 15 years. Our whimsical projection envisions a lesser growth in the next 22 years.

People Are Competition, Too

A vastly expanding market cannot be interpreted as an opportunity for those established in business to just sit back and share an ever-increasing pie.

People provide markets. They also offer competition. A growing population means more entrepreneurs starting new enterprises to produce more goods and services.

In 1939, this country had 27,000 metalworking establishments. Now it has more than 55,000 such establishments.

Competition will be keen no matter how large the market becomes, assuming the economy continues free.

Is Management Prepared?

Since the outbreak of World War II, we largely have operated in a noncompetitive economy. Production was dictated by emergency conditions.

There was little need for competitive selling. Either the government took our output or it was gobbled up by eager civilians in a restricted economy.

Production costs were not too serious a problem. Either the government paid the bill or increased costs could easily be passed along to the consumer.

Efficiency was gaged largely by ability to get out the production, regardless of cost.

Management itself developed many bad habits. Cost-plus contracts, excess profits taxes, 18-cent dollars and the general indifference to costs were conducive to laxity. Waste, so obvious in government affairs, tended to seep over into industry.

We developed an expense-account bulge.

The return of competition, even in a high-level economy, will necessitate corrections.

Progress Unlimited

Alert and competent metalworking management will welcome rather than dread the return of keen competition.

Particularly in a high-level economy, free competition offers tremendous opportunities for growth and development.

Industry's greatest forward strides have been made during competitive periods. Witness the automotive industry's technical and economic progress in the 1930s when it was leading the way out of the great depression.

There can be no progress for those companies which do not improve their products, produce them efficiently and sell them aggressively. Growth will be possible only for those organizations that put their management, production, purchasing, engineering, research and distribution forces in fighting trim.

For most companies, the latter part of 1953 has been a transition period. Many managements have used it as a time to catch their breaths and to appraise what's ahead. This year will really see competitive forces at work. Wise management will be alert to steps to meet the challenge.

Strengthen the Sales Effort

Most obvious move is revitalization of the sales effort. In the past 13 years, sales organizations in many companies deteriorated. There was no need for a sales effort. Often the company had little or nothing to sell. Its output was allocated. Salesmen were assigned to other jobs—to expediting materials or to placating customers whose requirements could not be filled. The sales ability of those remaining in the force may have atrophied.

Reorganization of the sales effort will require first a complete reappraisal of the market. Great changes have occurred since 1940. There are more customers. They are different people. Sales territories may have to be realigned.

Second, a vigorous sales training program will be called for—to train new men and to retrain oldsters.

Third, the sales problem will have to be re-examined. New techniques will be required. There will be greater dependence on mechanized selling. Engineering in selling will become more important. Sales people in the field will need better ammunition from the home office force.

Needed: Better Management

Not only will management need to overhaul its sales departments, but it needs to take a long and close look at its own ranks. Management decisions and actions, obviously, become more important in a competitive economy.

In some cases a weeding out and replacement process will be necessary. It is no secret that during the fast expansion forced on many companies during the emergency competent manpower was not available. In many cases the men upgraded to management jobs developed sufficient skill and judgment to handle them. Where they did not, remedial action will be necessary.

There is a constant need for more and more competent management men in a growing economy. And the company that is to progress must assure itself a continuing supply of such talent. Mostly, they will have to develop management men themselves. Where formerly it was possible to raid competitors, the management pension plans now in effect make this less feasible. Thus lost is the cross-fertilization caused by ideas which such men brought with them.

Management training programs, including brushup courses at the great universities, job rotation plans, conferences-in-training, will become a must by management.

Grow with New Products

Many metalworking companies multiplied their capacity during the war and emergency years to turn out war materiel. They have over-expanded in terms of their civilian products. As defense requirements taper, new products must be introduced to utilize such capacity.

Changing technology requires companies to be alert to diversification and to watch for new products. The company which made wringer washers in 1940 will have trouble keeping its facilities busy in the era of automatic washers unless it changes over.

The trend toward automation offers many opportunities for new products and diversification.

That management already is alert to this need is indicated by plans of two-thirds of met-

alworking companies to introduce new products during the next 12 months.

Design for Tomorrow

Design in civilian products has been given scarcely more than casual attention during the emergency years. Many household appliances, for example, are little improved over the prewar models.

Return to competitive markets again will emphasize the necessity for better design for two purposes: (1) For more efficient production; and (2) for greater appeal to the customer.

Regularizing Production and Employment

Back of the demand for a guaranteed annual wage by the big labor unions is the desire of the worker for assurance of a steady income. GAW is only a symptom. Before any annual wage plan can be made to work, production and employment must be regularized. If production and employment are regularized, the annual wage demand will disappear.

This poses management with one of its knottiest problems. Many will say it is impossible of solution. They want a regularized production and employment, not only for the security it affords employees but also for the manufacturing economies it offers. But how, they ask, can it be accomplished in the heavy goods field. You can't warehouse 10 million tons of steel nor store 2 million automobiles.

No answer to this problem has yet been brought forward. But the big unions are supplying a strong economic incentive for finding a solution to it in their demand for GAW. It is hardly conceivable that the brains of industry will fail to find a satisfactory solution.

Foremen—Bridge to Efficiency

Don't overlook your foreman when you are thinking about cutting costs and increasing efficiency. The importance of the supervisor in keeping production lines moving cannot be overemphasized. He is management's direct contact with the worker. He makes or breaks a plant's communications system. He is the man in the middle. He brings worker opinion to the attention of management and translates company policy into action on the production line.

Wise management will pay close attention to the selection and training of foremen. Furthermore it will effectively use them in the battle against rising costs and inefficiency.

Distribution: New Industrial Frontier

A relatively unexplored frontier for cost-cutting and increased efficiency lies in the field of distribution. That encompasses selling, advertising, packaging, warehousing and transporting manufactured products to the consumer. For metalworking manufacturers, distribution costs amount up to 25 per cent, in many cases more, of the factory selling price.

Many experts believe the opportunities for savings and efficiencies are greater in distribution than in production.

These economies might be effected by:

1. More market research and more aid by manufacturers to their distributors to effect better integration of distribution and manufacturing operations.

2. A solution to the dilemma of distance between suppliers and customers so that the current average 10 per cent of the cost of an item being spent on freight is reduced.

3. Better training, direction and utilization of the 17 million people in distribution.

Automation: Second Industrial Revolution

Although the day of the completely automatic factory probably is far distant, many automation elements are here today. More will move into the industrial scene in the months to come. These automatic devices increasingly will replace human brains and nerves in the manufacture and distribution of metalworking products. They will contribute toward providing more goods for more people at lower costs.

While the adoption of automation probably will be an evolutionary process, you cannot afford not to keep in close touch with developments in this field. Explore the possibilities of automation or the elements of automation.

North Is Up

We are entering a competitive era, but it will not be like that of the 1930s. We are entering an era of expansion, but it will not be like that of the 1940s. Without the help of precedent, we must reorient our resources. To do this we need a new compass. On the route ahead, the problem is not survival but progress.

A SPECIAL REPORT STEEL
JANUARY 4, 1954

What Metalworking Management Expects in 1954

WHEN soft spots developed in the economy last fall, professional prognosticators, journalists and some businessmen predicted we were facing a downward adjustment of serious proportions. They had strong evidence to support their beliefs. Some areas in the economy were depressed. Capacity operations disappeared in many. The buyer's market had returned in most.

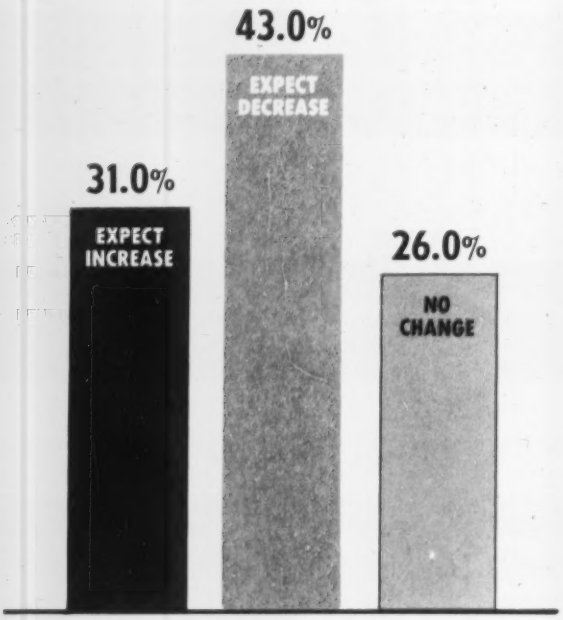
The editors of this publication then decided to check again the expectations of its readers on the future of metalworking business. Experience has shown that today's expectations of industry executives are likely to be tomorrow's realities. Every postwar survey by STEEL substantiates this point.

The results of the current survey, from questionnaires directed to more than 5000 metalworking executives, indicate 1954 will be the industry's second best year. It will be only fractionally below the peak established in 1953. Profitwise, it easily can be much better.

- Production volume will ease from 1953 peak
- Employment will dip 2 per cent
- Selling prices, unit costs will continue steady
- Manufacturing capacity will rise 12 per cent
- Defense will take smaller proportion of output
- Sales organizations will be strengthened
- Research expenditures will expand
- New products will be introduced

PRODUCTION

Metalworking Management Expects Dollar Volume To Ease Off 2%



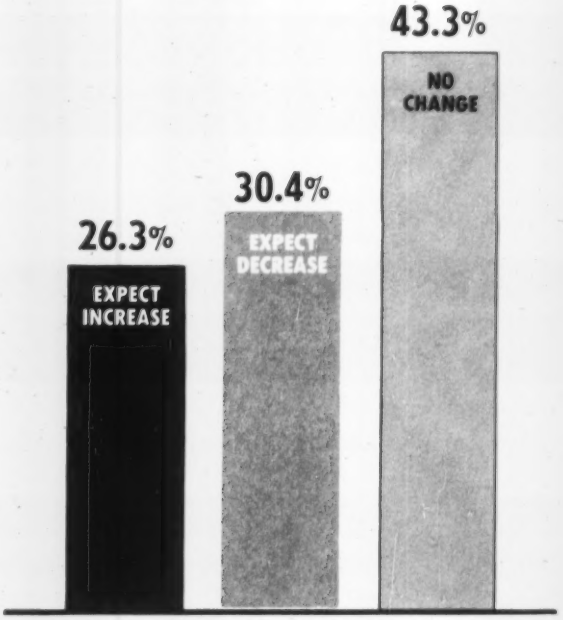
OF THOSE EXPECTING INCREASE

5.2% expect it will be less than 5%
34.3% expect it will be 5-10%
32.4% expect it will be 10-15%
20.0% expect it will be 15-20%
8.1% expect it will be more than 20%

OF THOSE EXPECTING DECREASE

5.8% expect it will be less than 5%
39.8% expect it will be 5-10%
29.6% expect it will be 10-15%
16.2% expect it will be 15-20%
8.6% expect it will be more than 20%

Second Half Volume Will Be 2% Higher Than First Half



OF THOSE EXPECTING INCREASE

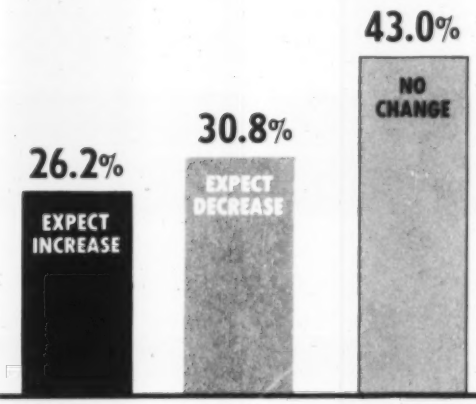
11.0% expect it will be less than 5%
33.5% expect it will be 5-10%
33.6% expect it will be 10-15%
10.3% expect it will be 15-20%
11.6% expect it will be more than 20%

OF THOSE EXPECTING DECREASE

22.5% expect it will be less than 5%
37.8% expect it will be 5-10%
20.9% expect it will be 10-15%
11.5% expect it will be 15-20%
7.3% expect it will be more than 20%

EMPLOYMENT

Management Expects Employment To Drop 2% in 1954



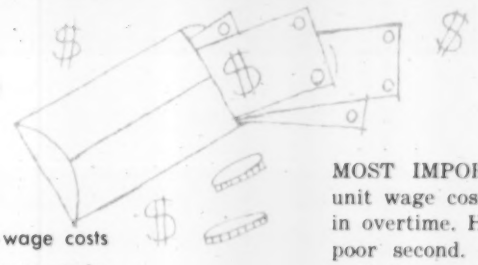
OF THOSE EXPECTING INCREASE

22.5% expect it will be less than 5%
36.5% expect it will be 5-10%
23.6% expect it will be 10-15%
11.2% expect it will be 15-20%
6.2% expect it will be more than 20%

OF THOSE EXPECTING DECREASE

18.5% expect it will be less than 5%
36.1% expect it will be 5-10%
25.4% expect it will be 10-15%
14.4% expect it will be 15-20%
5.6% expect it will be more than 20%

Unit Wage Cost Will Increase In 1954



54.5% expect higher unit wage costs
11.2% expect lower unit wage costs
34.3% expect no change

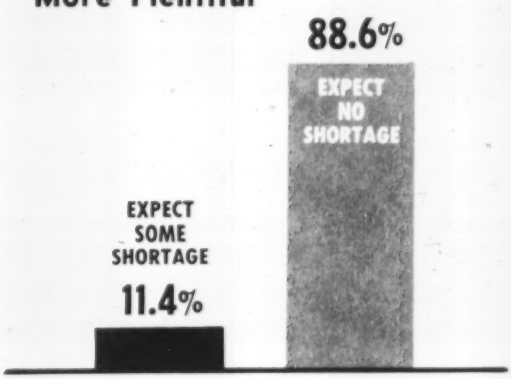
MOST IMPORTANT factor in reducing unit wage costs in 1954 will be reduction in overtime. Higher productivity will be a poor second. Lower wage rates are expected by practically no employers.

Many employers, whose plants have been operating on a 48-hour week, figure overtime reduction can save up to 10 per cent of their unit wage costs. The average savings, of course, would be considerably less.

While higher productivity is expected by a large majority of respondents to STEEL's questionnaire, employers generally believe the resulting gains will be offset by compensating pay. Many wage contracts now contain an annual improvement factor compensating workers for a theoretical gain in productivity. In the opinion of many, the improvement factor compensates for a greater productivity gain than actually develops.

Most important factor in increasing unit wage costs, metalworking executives expect, will be increases in wage rates. Second most important factor in increasing unit wage costs will be fringe benefits. Together, these are expected to more than offset any savings through reduced overtime and higher productivity.

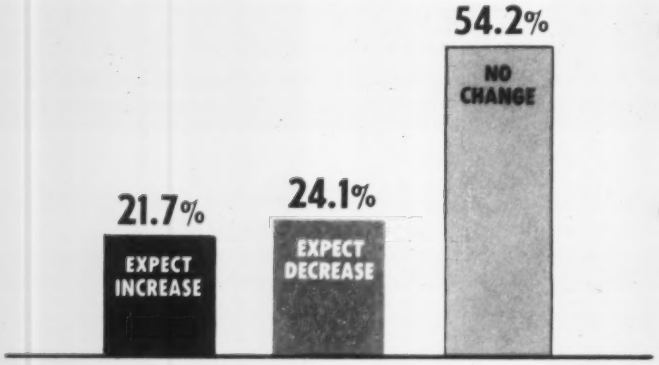
Skilled Workers Will Be More Plentiful



(In 1953, 24% reported skilled labor shortages resulted in output curtailment)

COSTS & PRICES

Selling Prices Are Expected To Drop 1% in 1954



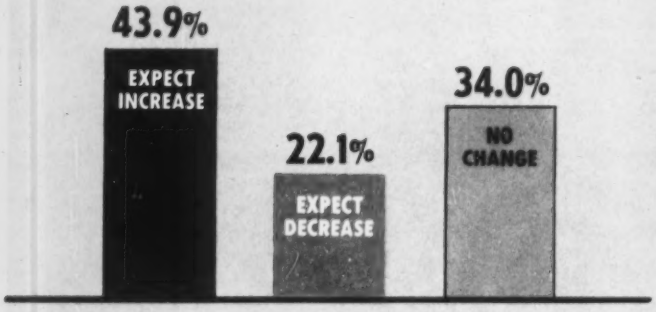
OF THOSE EXPECTING INCREASE

43.0% expect it will be less than 5%
48.3% expect it will be 5-10%
7.3% expect it will be 10-15%
0.8% expect it will be 15-20%
0.6% expect it will be more than 20%

OF THOSE EXPECTING DECREASE

34.6% expect it will be less than 5%
48.5% expect it will be 5-10%
11.9% expect it will be 10-15%
5.0% expect it will be 15-20%
None expect it will be more than 20%

Unit Cost of Manufacturing Will Decrease by 1%



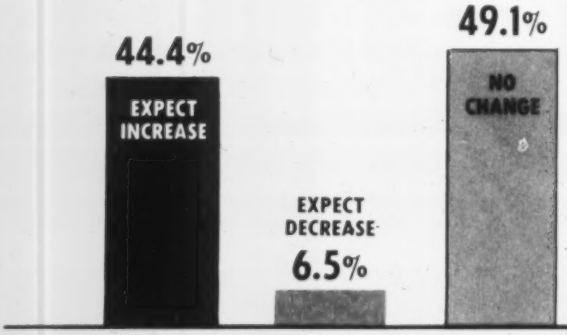
OF THOSE EXPECTING INCREASE

56.5% expect it will be less than 5%
37.5% expect it will be 5-10%
4.9% expect it will be 10-15%
1.1% expect it will be 15-20%
None expect it will exceed 20%

OF THOSE EXPECTING DECREASE

53.4% expect it will be less than 5%
36.1% expect it will be 5-10%
9.0% expect it will be 10-15%
1.5% expect it will be 15-20%
None expect it will be more than 20%

Sales and Distribution Costs Will Go Up 5%



OF THOSE EXPECTING INCREASE

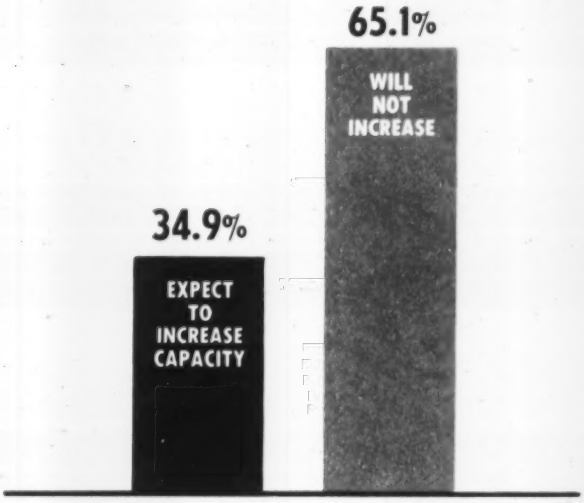
36.9% expect it will be less than 5%
44.4% expect it will be 5-10%
14.0% expect it will be 10-15%
4.3% expect it will be 15-20%
0.4% expect it will be more than 20%

OF THOSE EXPECTING DECREASE

55.2% expect it will be less than 5%
21.1% expect it will be 5-10%
18.4% expect it will be 10-15%
5.3% expect it will be 15-20%
None expect it will be more than 20%

EXPANSION

Capacity Is Expected To Increase 12% During 1954



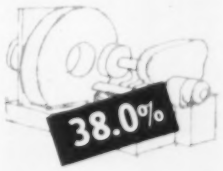
OF THOSE EXPANDING

44.3% will increase capacity by less than 10%
45.2% will increase capacity by 10-25%
9.6% will increase capacity by 25-50%
0.9% will increase capacity by more than 50%

OF THOSE EXPANDING

WILL BUILD ADDITIONS

WILL BUILD NEW PLANTS



WILL ADD NEW EQUIPMENT

DEFENSE

Defense Work Will Drop To 15% of Total Production

32.8% expect to do no defense work
52.8% expect it will be less than 25%
8.2% expect it will be 25-50%
3.9% expect it will be 50-75%
2.3% expect it will be more than 75%

In 1953, Defense Work Amounted To 20% of Total

27.9% did no defense work
47.6% report less than 25%
15.4% report 25-50%
5.1% report 50-75%
4.0% report more than 75%

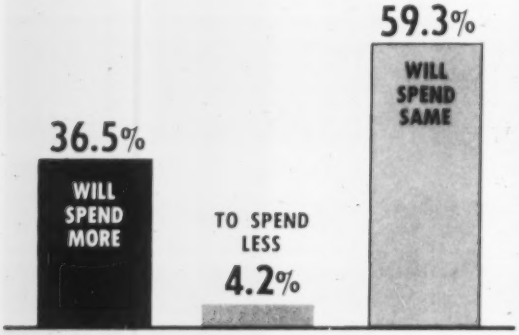
SELLING

70.6% Plan To Strengthen Their Sales Organizations in 1954

Larger companies are accenting sales force expansion more than are the smaller companies. Seventy-five per cent of metalworking companies employing more than 500 are enlarging their sales staffs. Only 66 per cent of companies employing fewer than 100 people are expanding their sales organizations.

PRODUCT RESEARCH

Management Expects To Spend 8% More on Product Research and Development



OF THOSE SPENDING MORE

10.5% will increase less than 5%
45.7% will increase 5-10%
25.9% will increase 10-15%
14.0% will increase 15-20%
3.9% will increase more than 20%

MARKETING RESEARCH

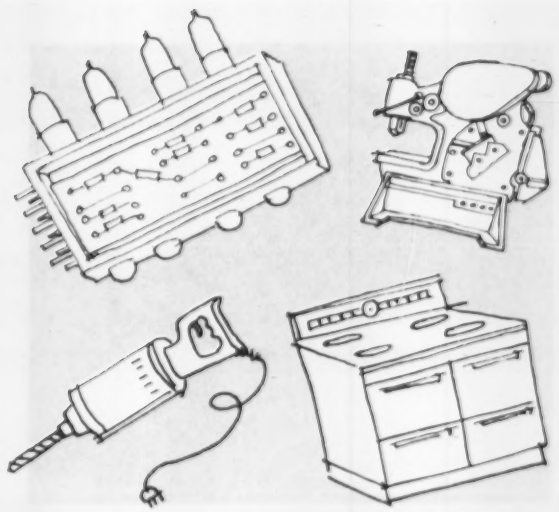
ONLY one out of ten metalworking companies has a formal marketing research department. Large companies are more likely to have such departments than are smaller companies. One in four companies employing more than 500 people have formal marketing research departments. Only 2 per cent of companies employing fewer than 100 people and only 9.5 per cent of companies employing 100 to 500 people have formal marketing research departments.

Four per cent of the companies which do not have such departments plan to establish them in 1954. Again the lead will be taken by the larger companies.

NEW PRODUCTS

64.7% Will Offer New Products in 1954

Trend toward automation and the dwindling of defense production are cited by responding companies as prime reasons for introducing new products. Metalworking companies are fascinated by the possibilities in supplying components for the automation lines they believe will become more common. Where defense work is falling off, they are seeking new civilian products to utilize expanded production capacity.



DISTRIBUTION

Management Expects To Pare Distribution Costs

THREE out of ten metalworking companies are planning campaigns to trim their distribution costs in 1954. These costs, which embrace selling, advertising, packaging, warehousing, transportation and related activities, range up to 50 per cent of the factory selling price. In a few cases they are even higher.

But seven out of eight metalworking companies believe their distribution costs are less than 25 per cent of selling price, a finding which experts in the distribution field are inclined to question. These men believe distribution costs actually are higher than most manufacturing executives realize and that distribution offers one of the most promising fields for cutting costs and effecting economies in the competitive era ahead.

That 30 per cent of the respondents to this survey intend to cut distribution costs is remarkable in face of the fact that most companies expect to expand their sales efforts this year. Selling costs alone will rise 5 per cent and seven out of ten companies will revamp and strengthen their sales organization.

How will the problem of trimming distribution costs be attacked?

Better training of distribution personnel ranks No. 1 in the plans of responding metalworking executives. Two out of five say this will be the first step they will take this year.

More marketing research will be the No. 2 step.

Better integration of manufacturing with distribution will be the third step.

Improved distribution accounting, closer attention to transportation costs, better warehousing and more economical packaging are other steps indicated.

TAXES

If Additional Taxes Are Necessary . . .

TWO out of three metalworking executives prefer a general excise tax to higher corporate income taxes if the federal government finds it necessary to add levies to offset the loss of revenue from expiring excess profits tax and lowered personal income tax.

The respondents indicate the choice offered is comparable to being given a choice between death by hanging and death before a firing squad. Comments attached to returned questionnaires indicate a firm belief that economy in government can obviate the necessity for any new taxes.

A national sales tax (not mentioned in STEEL's questionnaire) was recommended by many correspondents. This they believe should apply to all products imported as well as those made in this country. Some suggested a national sales tax should apply to farm products and to used equipment and materials.

Opinions on the proposal for a 4.5 to 5 per cent level excise tax on all manufactured products, except foods and medicines (as recommended by the National Association of Manufacturers) to replace current excise taxes, is evenly divided. The NAM proposal contemplates raising the same amount of revenue as is now realized from the patch-work of excise taxes.

How companies vote, by employment groups, is shown in table below.

U.S. REVENUES

Net Receipts
Millions of Dollars

1953	$65,219
1952	62,129
1951	48,142
1950	37,043
1949	38,246
1948	44,746
1947	44,703
1946	43,037
1945	46,456
1944	44,149
1943	22,281
1942	12,799
1941	7,607
1940	5,387
1939	5,164
1938	5,854
1937	5,028
1936	4,115
1935	3,800
1934	3,115
1933	2,079
1932	2,005
1931	3,190
1930	4,177
1929	4,033
1928	4,042
1927	4,129
1926	3,962
1925	3,780
1924	4,012
1923	4,007
1922	4,109
1921	5,625
1920	6,695
1919	5,152
1918	3,664
1917	1,124

Treasury Dept.

IN PLANTS EMPLOYING:	MANAGEMENT'S PREFERENCE: Higher Corporate Income Tax	General Excise Tax	HOW THEY FEEL ABOUT MANUFACTURERS EXCISE TAX: For	Against
20 to 99	33.8%	66.2%	44.8%	55.2%
100 to 499	37.7%	62.3%	52.1%	47.9%
500 or more	26.5%	73.5%	59.5%	40.5%
All Plants	34.5%	65.5%	49.8%	50.2%

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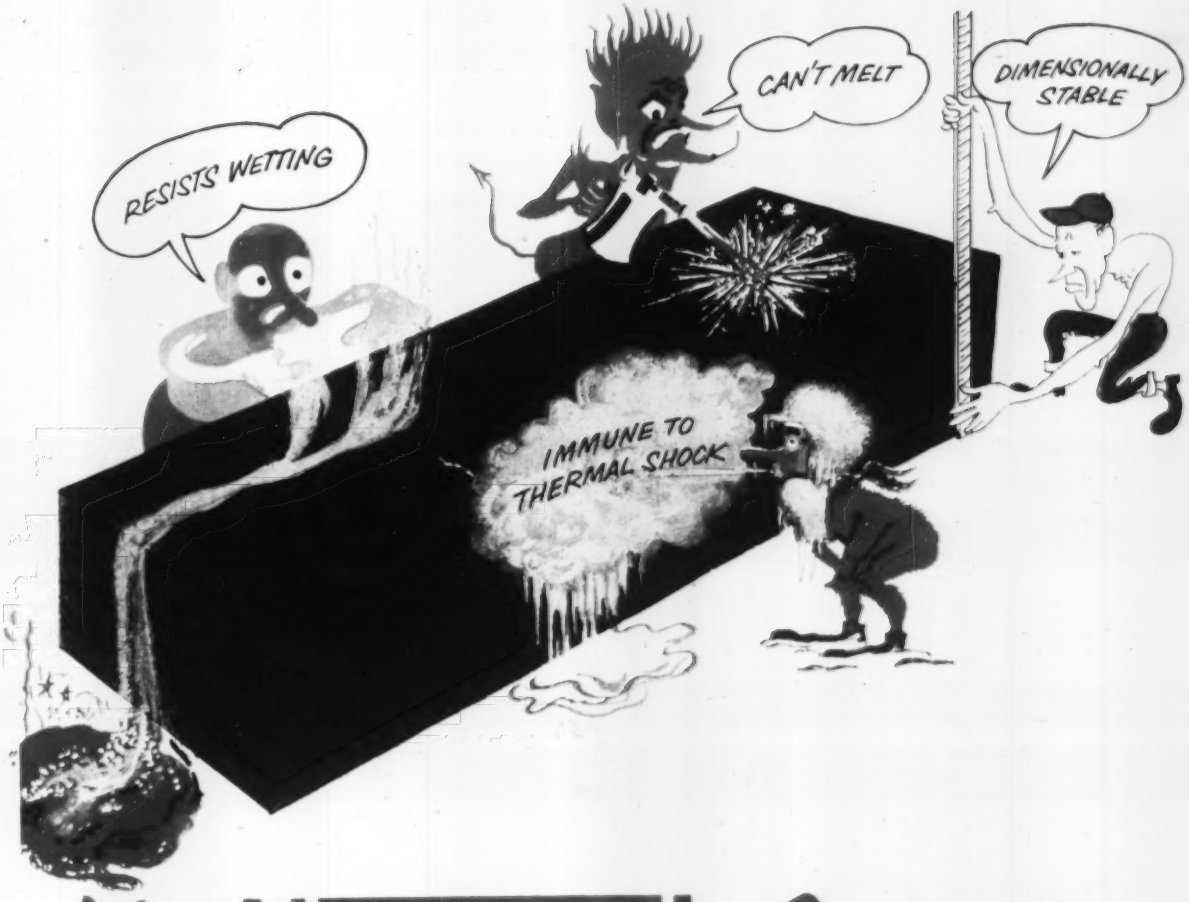

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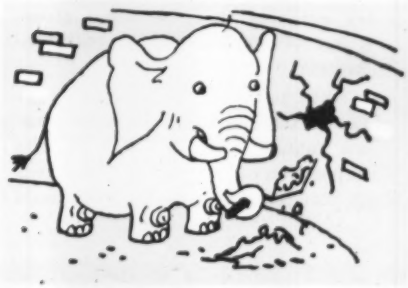
By E. C. KREUTZBERG *Washington Editor*



Republican Program: Plug Gaps In Defenses and the Economy

THE TARGET has been set. The job of the Republican sharpshooters in 1954 will be to try to hit it.

The goal is simply stated but difficult to achieve: Keep both our defenses and our economy up.

Means to an End—To achieve that end, one means is still economy in government. The House Appropriations Committee took the unusual step of beginning hearings in December to get a head start on further cuts for fiscal 1955. But as long as the Communist threat continues, further savings in defense will be moderate. Spending for the military will be maintained at about the present level, even though appropriations for fiscal 1955 beginning next July 1 may be cut $2 billion or so. Carry-over funds will keep expenditures in fiscal 1955 at about the same as in fiscal 1954.

Indications are that foreign aid also—particularly military aid—will not be cut as much as had been hoped. The Russians say they will consider President Eisenhower's proposal for an atomic disarmament, but nobody in Washington counts on the end of the atomic race, particularly since the Reds are stalling on a Korean settlement.

The Sad Truth—So, to keep up our defenses, heavy federal spending will continue in 1954. And there's no hope of balancing the federal budget in fiscal 1955, a situation which the White House believes could have a depressant effect on the economy. The President says he expects a deficit of possibly around $6 billion that year.

As far as business is concerned, this situation has two principal implications. One is that the government's need for revenue will continue great, so that a search is under way for new taxes to offset the reductions scheduled for Jan. 1. The other is that the administration will intensify its unpublicized drive to develop antidepression programs to be launched in case of need.

Just in Case—This doesn't mean that the administration is worried about business now. Aside from a few weak spots here and there that can be handled without emergency treatment, the 1954 business outlook is seen as good. But the President is keeping his fingers crossed. Every week he gets a briefing from his council of economic advisers on the business trend. He told his press conference in November that if any signs of a coming business depression appear he will move in with all the vast powers of the government to take preventive steps. Incidentally, he would not have to wait on Congress in such a juncture since he already is clothed with ample powers to deal with any business emergency. All that is needed is the issuance of directives for dispensation of the needed antidepression medicine.

Aside from the emphasis on defense and the maintenance of a healthy economy, many national policies are up for determination in 1954.

Taxes—Expiration of the excess profits tax and termination of the 11 per cent increase in individual income taxes on Dec. 31 will stand. Normal tax rate on corporations, now due to drop Apr. 1 from 52 to 47 per cent, is expected to be set at around 50 per cent. The big question is on the excise taxes due to expire Apr. 1. The Treasury will request new taxes on many products; its recommendations will be along the lines of the general manufacturers tax on which there has been wide publicity. No general sales tax is likely.

Liberalization of depreciation is definitely in the cards, with such questions to be determined as whether the declining balance, optional or some other treatment will be prescribed. At least a start will be made toward providing relief of double taxation of dividends. Treatment of research and development expenditures will be liberalized to encourage industrial expansion. More liberal exemptions will be allowed in computing personal income taxes—as baby-sitting expenses for working mothers, medicial expenses, cost of educating sons and daughters. There will be no increase in the $600 personal exemption because of the prohibitive cost.

Farm Price Supports—This subject is of special importance because of the farmers' decreasing purchasing power and the need to keep farmers strong in the economy. Agriculture Secretary Ezra T. Benson, whose logic is regarded by many farmers as faulty, will ask for many changes in the 1949 price support act aimed at placing the farmer in a better position to look out for himself. The 1949 act provided permanently for support at 90 per cent of parity of prices on cotton, corn, wheat, rice, tobacco, peanuts, milk and butter fat, honey, wool, mohair and tung nuts. In addition, it allowed the secretary flexible au-

thority to use his discretion in giving support to other farm products through 1954. It is this flexible support feature on which Congress will legislate in the coming year, as well as pass on the secretary's proposals for changes.

The outlook is that there will be no weakening of the support program. The inventory in the hands of the CCC includes mainly wheat, corn, butter, cheese, dried milk and cotton seed oil—that is, staples. Legislators from farm areas point out that while these stocks represent an outlay of $4.4-billion of public funds, they are a reasonable hedge against possible loss of crops in a bad year. For example, the butter stocks break down to 1½ pounds for each unit of population. Hence what is good for the farmer is good for the country in two ways, they say.

Labor—A substantial number of congressmen wish to avoid voting in an election year on so emotion-ridden an issue as Taft-Hartley amendments, but Republican leaders promise some legislation—at least to answer the universal criticism, from unions and employers, over the way in which the National Labor Relations Board has administered the act in the past. Several proposals are under consideration, from abolishing the board to restricting it to judicial functions only, leaving the prosecutions to a new agency or to the

T-H CHANGES?
. . . nothing spectacular is likely

Department of Justice and the federal courts. A fight will be made to give precedence to the state laws concerned with strikes and picketing. While the administration favors lessening of the federal concern with labor matters, there is much opposition. Certainly repeal of Taft-Hartley is not indicated at the present time.

There is a possibility that Congress may enact a definition of secondary boycotts to facilitate enforcement of the ban against such disturbances. Another proposal that will be brought up is the one to give the President a freer hand in handling of emergency strikes. Other proposals would eliminate the present anticommunist affidavit, define the term "supervisor" and set up government supervision of union welfare funds. There are various other ideas in the hopper, as that of Sen. Irving Ives (Rep., N. Y.) to appoint steel and other industry councils as the best media for preventing strikes. Due to radically divergent views and the loss of Senator Taft to reconcile them, the Taft-Hartley amendment move could get stalled at any point just as it was in 1953. So the word as to the outlook for important labor legislation is—hold your hat, anything can happen.

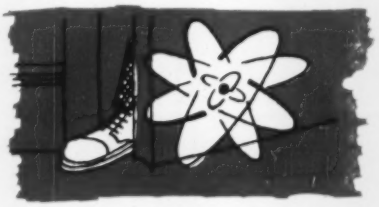
Atomic Energy — The present act is to be rewritten to encourage and permit private industry to benefit from the government's expenditure of $10 billion for pioneer work in this field. Complex questions to be decided: To what extent should government control be continued? Should private companies be permitted to own fissionable materials and how could this be arranged to prevent injury to the public security? What about the patent problem?

The Atomic Energy Commission has a well-considered program to be submitted to Congress, and this will be the basis of the legislation.

Foreign Trade—The Randall Commission on Foreign Economic Policy will submit its report by Jan. 15 after which President Eisenhower will present the administration's recommendations to Congress. Preponderant opinion among commission members coincides with the administration position that tariffs must be gradually lowered as a general thing to encourage foreign trade — which means trouble ahead from the many industries that claim they need all the protection they now have or more.

The commission also will recommend policy in regard to foreign investments, currency convertibility and the place of national and international trading, economic and banking organizations in promoting world trade. On these latter subjects there is some divergence of opinion but no real controversy.

Antitrust Laws—Action is expected on a bill to repeal the present mandatory provision for the imposition of triple-damage awards in antitrust cases. Instead it would



INDUSTRY GETS A CHANCE
. . . to participate more in atomics

be mandatory to award costs and actual damages, but the courts would be given discretion to grant up to twofold the costs and actual damages. The House Judiciary Committee will examine further the need for legislation to clarify the right to absorb freight in meeting competition. Generally, it is believed the Federal Trade Commission's recognition of this right is sufficient excepting possibly that sellers should be given protection against ill-founded triple-damage suits.

The big job of rewriting the antitrust laws in terms of today's needs will go over till 1955, so as to give consideration to the report to be submitted late in 1954 by the Attorney General's Committee To Study the Antitrust Laws.

Social Security — Immediate question of interest to employers is whether Congress will approve the administration's proposal to freeze the combined payroll tax at 3 per cent or let it go to the scheduled 4 per cent on Jan. 1. Strangely enough, the Ways & Means Committee and labor leaders generally want the rate to go up. On the basis of statistics the government does not need the extra 1 per cent because 1953 benefit payments are around $3 billion as against income (tax and interest) of $4.4 billion.

The Ways & Means Committee will go to work early in January

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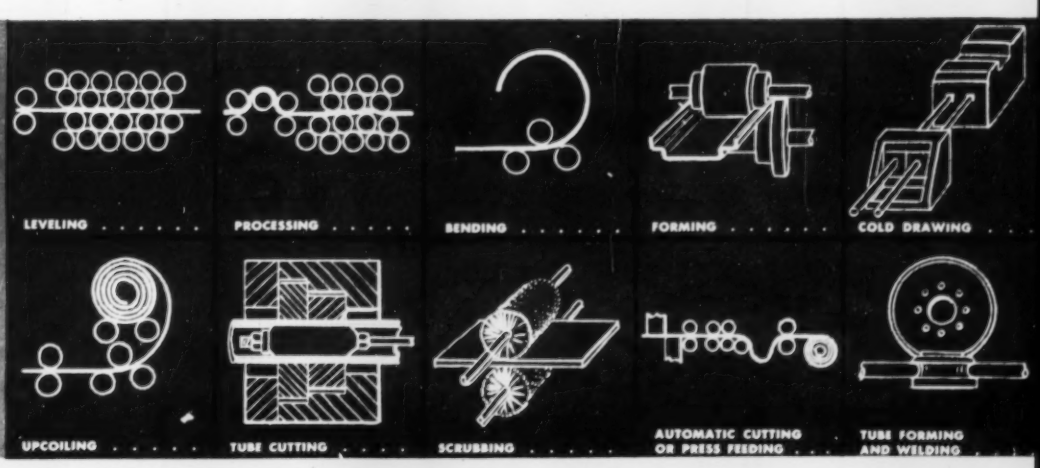
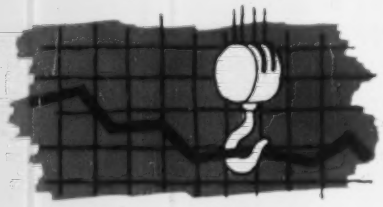


on a study to determine whether benefit payments should be increased and liberalized, as well as whether coverage should be extended to public employees, farmers, more farm workers, more domestic servants, professional engineers and accountants and others.

Unemployment Insurance—The law governing unemployment insurance is to be improved next year under a House-passed bill, still to be approved by the Senate, to set up a $200-million revolving



DEPRESSION-PROOFING
. . . federal measures coming

unemployment insurance account in the federal Treasury, of which $50-$60 million a year (the surplus of tax collections over the congressional appropriation) would be turned over to the states to help finance their unemployment insurance programs.

Many more people would be brought under the system by a bill in the Ways & Means Committee which would extend unemployment insurance coverage to employers of one or more instead of eight or more as at present. President Eisenhower also will appeal to the states in January to increase their benefit payments and pay them over longer periods.

Mobilization Base Expansion—Will the Office of Defense Mobilization call for a third round of aluminum expansion? Will it undertake expansion in capacity to produce certain "elephant" machine tools and other equipment? What gaps in the mobilization readiness base need attention?

These questions are being studied jointly by ODM and the Department of Defense with a view to asking Congress early next year for the necessary funds.

Highway Aid—The big question is whether to increase federal highway aid from $575 million a year to, say, around $900 million as many authorities recommend. Bearing on the answer will be the business trend at the time Congress shapes policy, for highway construction is regarded as an ideal depression-fighting tool. Rule of thumb has it that for every dollar spent directly on highway construction about $8 are spent indirectly immediately after.

On the request of the governors' conference that the gasoline tax be abandoned to the states, it is expected Congress will decide to keep the federal 2 cent tax which brings in revenue to the federal government at the rate of $700 million a year.

Administrative Procedure — Of significance to business is a report which the President's Conference on Administrative Procedure will submit early in 1954 for reducing paper work, attorneys' time, court time and other costs in dealing with the various government departments and agencies that grant licenses and permits, bring suits, and that have other activities involving businessmen.

The report will recommend 21 ways of short-cutting procedure and will recommend establishment in the Justice department of a new Office of Administrative Procedure to see to it that the improvements are adopted by the government units and the courts.

Renegotiation — Congress will extend the Renegotiation Act to apply to defense production income and accruals through 1954. The House passed the bill and the question now is on resolving amendments reported out by the Senate Finance Committee. These amendments would ease impact of the act on industry. One would raise to $500,000, from the present $250,000, the renegotiable minimum. The other would broaden the exemption of "stock items" to include "all standard commercial articles."

A House bill would help machine tool and other equipment builders by extending the present partial exemption of equipment bought with private funds to equipment bought with government money.

Public Power—The Senate Judiciary Subcommittee, which in December served as a sounding board for the many proponents of public power, may conduct a broad review of the Eisenhower administration's power policy which, in general, favors power development with private funds and under decisions by the people in the interested areas.

The current agitation is over objections by the Farmers Union and REA co-operatives to the administration's new power marketing rules and regulations.

Shipbuilding—Awaiting House action is a Senate-passed bill to encourage building of privately-owned tankers with government assistance. Principal feature is a provision under which 10-year-old tankers could be traded in to the government.

The Navy wants the government to build up a reserve of these tankers. Commerce department is studying a new campaign to encourage building of passenger and cargo ships.

Housing—Housing construction in 1954 would get a shot in the arm if the proposals made in December by the President's advisory committee on government

NO BALANCE IN FISCAL 1955
. . . high U.S. spending to continue

housing policy get translated into action. But all the proposals are not likely to be implemented unless there's a strong threat of depression. As it looks now, 1954 will see nearly 1 million new housing starts without any additional federal help.

The committee recommended liberalizations of Federal Housing Administration mortgage insurance, including 40-year mortgages on low-cost homes; a lease-and-purchase plan to encourage the building of rental dwellings which tenants can eventually buy; continued public housing; liberalized repair loans; and equality in FHA

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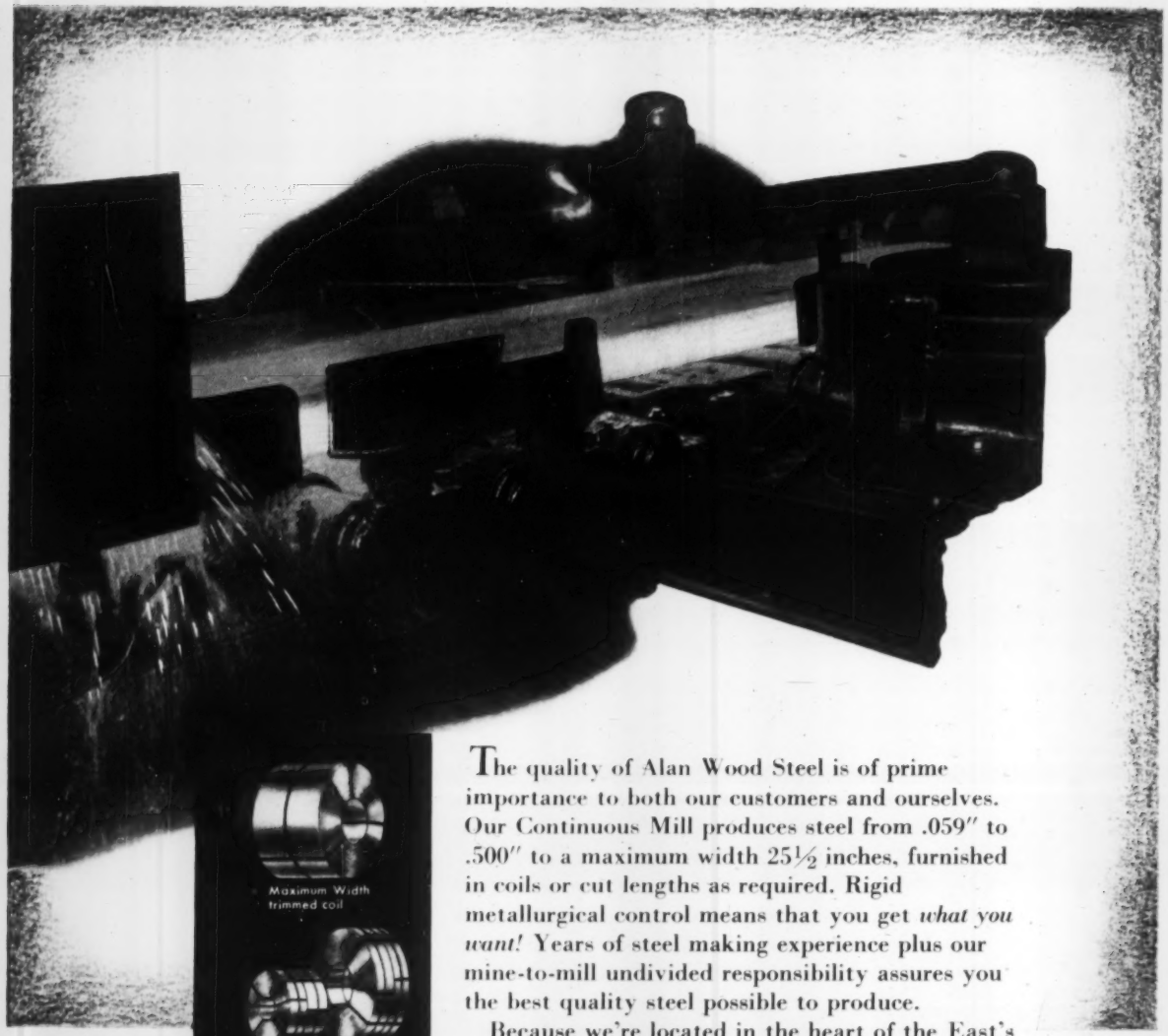

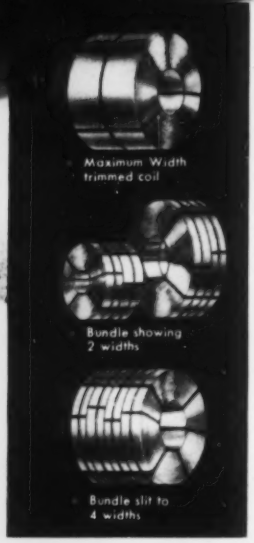

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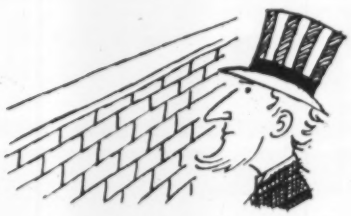
financing between old and new homes. Hottest debates in the 1954 session of Congress will be on public housing. In 1949, 135,000 units were subsidized, but only 20,000 will be in fiscal 1954. Many Republicans in Congress would eliminate that aid altogether in fiscal 1955.

Minerals—Testimony developed in recent hearings by Sen. George W. Mahne (Rep., Nev.) on the effects of tariffs, stockpiling and other government policies on the mining industry led to the appointment of a cabinet-level committee (McKay, Dulles, Weeks and Flemming) to review present mineral resource policy.

A report is expected early in 1954. Their recommendations will include more intensive exploration at home and resuscitation of the domestic mining industries through subsidies; buying contracts; the broader use of fast amortization to encourage expansion; and increasing research programs to find acceptable substitutes for the minerals we do not produce within our boundaries. Mr. Dulles' job is to enable larger imports of strategic and critical minerals by establishment of a better climate for investment of private American capital in foreign mineral developments where laws now discourage such investment. As an approach to the raw material problem from the defense angle, Mr. Flemming



TROUBLE IN TARIFFS
. . . lower walls ahead?

has established in the Office of Defense Mobilization an Interdepartmental Materials Advisory Committee.

Water—As part of the conservation policy, a national water-saving and purification policy is in the works. Departments of Defense, Agriculture and Interior, the major interested government bodies, will formulate something soon.

Odds are that their proposals will put heavy emphasis on local option. The administration wants to avoid the necessity of federal laws on the subject, believing that this is an area where the states' rights should be maintained. The purpose of the federal policy declaration will be to spur those few states that are still backward on the matter and to publicize the problem so that the general public will be aware of the situation.

Business in Government—Still another policy to be hammered out in the next 12 months involves business influence in government. The White House doesn't think there is undue influence, but is worried about charges to that effect by labor unions and some newspaper columnists.

So, in 1954 the administration may appoint fewer industrialists to federal posts and in general seek to dispel any impression of strong business influence on government policies. Actually, this will not be too tough on industry because most major jobs that might take businessmen are already filled with industrialists. The Commerce department is being upgraded with a policy role and responsibilities that make it a genuine spokesman for business for the first time since Herbert Hoover was president. The trend toward that upgrading will continue in 1954.

Controls—You can expect less paperwork in connection with the Defense Materials System this year. The system itself, with its seven regulations and six orders, will remain intact; the changes will be aimed principally at eliminating reports now submitted by suppliers of materials for defense contracts and at reducing paperwork in Washington.

The whole controls philosophy of the White House is the fewer curbs the better. Those that are remaining serve partly as a stand-by arrangement to give us a head start in case an all out war requires full curbs again.

Industrial Dispersion—Look for greater efforts by the U. S. to encourage industrial dispersion. Way back in August, 1951, former President Truman set forth a statement that industry ought to disperse. To implement that, ODM has a rule that the dispersion element is a factor in giving out tax write-offs.

Actually, the rule has not meant much. Most companies have been allowed to build plants in the 70 heavily industrialized U. S. cities that are considered prime target areas, if they could show that locating outside the area would bring undue hardships in getting

STILL HEAVY
. . . the tax load remains

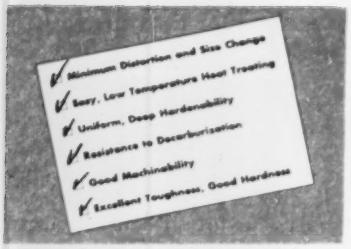
labor, in transportation or in incurring expenses. ODM will get tougher on this from now on and will also seek to encourage bomb-proof construction in industry, such as that undertaken by Cincinnati Milling Machine Co.

Stockpiling—Washington would like to increase requirements for some stockpile materials. But there are political angles here that make that objective difficult. Some 80 per cent of the total stockpile dollar objective is in hand or under contract, but inventories of a few critical materials remain short of the goal.

Six months ago, $4.2 billion worth of stocks were on hand, $1.5-billion under contract and $1.5-billion still to go. Stocks of 24 of the 76 stockpile materials were still less than 50 per cent of the objective although additional amounts were on order.

St. Lawrence Seaway — Senate floor action on this project is scheduled right after Congress convenes. On the House side the bill is still in the Foreign Affairs Committee.

The Republicans have a lot of projects for 1954. Most of them aim at keeping our defenses and our economy up. The marksmanship on 1953 targets by administration and congressional leaders was not spectacular. But the Republicans had a lot of practice last year, and the score for the next 12 months promises to be higher.



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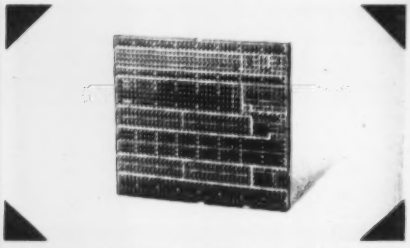

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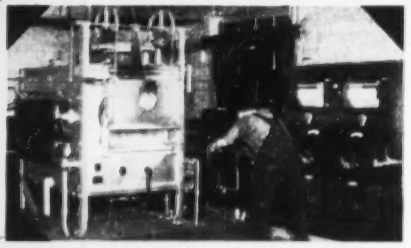

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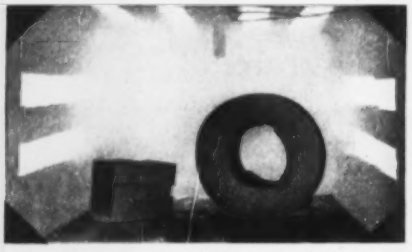

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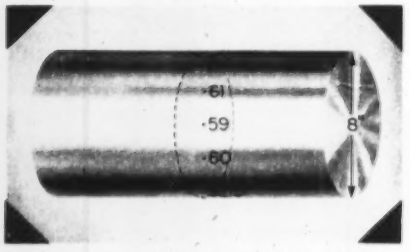

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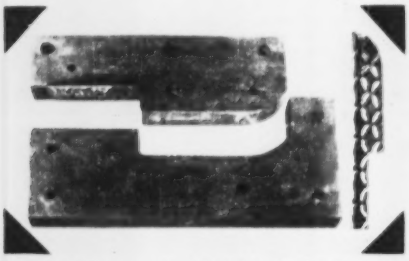

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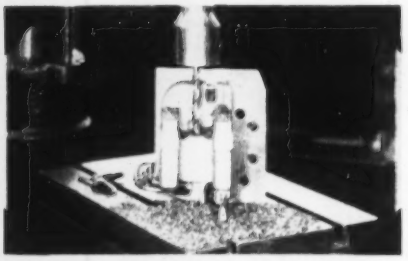

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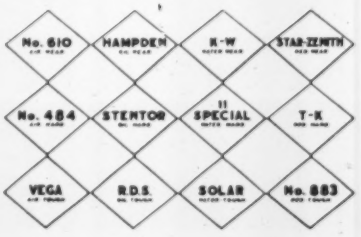

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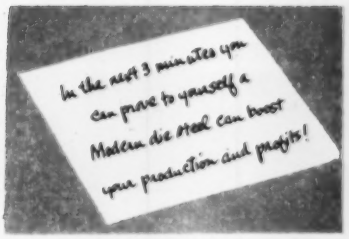

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COMPARE it with the die steel you use . . .

Does the steel you use provide this Freedom from Size Change in Hardening?

A piece of *Vega* ¾" rd. x 1" lg. when air treated from 1550° F. will expand about .0005" per in. of length when air cooled . . . and upon drawing at 400° F will return to within about .0003" of original length!

Can the Air-Hardening Die Steel you use be treated successfully from only 1550° F?

Consider the *savings* you could effect in fuel economy and time, plus the *benefits* this low temperature heat treatment gives you . . . benefits like extra safety, minimum size change, less warpage.

Does the Air-Hardening Die Steel you use provide Extra Economy in Hardening?

Vega not only often frees you from pack hardening and special high temperature furnaces . . . but gives you *new* freedom from excessive scaling!

Do you have trouble getting full hardness in heavy sections?

Vega will free you from troubles on this score. As one customer reports, "No steel we know of can be hardened to Rockwell C-60 with a drop of not more than 2 points from surface to center of a 17" dia. forging."

Are you up against problems of chipping and breakage with the Air-Hardening Die Steel you use?

If this is one of your problems, you'll like the combination of excellent toughness and good hardness *Vega* gives you. Here is real assurance of consistently long and trouble-free production runs.

Do your machinists have to "sweat out" the machining of Air-Hardening Die Steels you now use?

If so, give your machinists a break, and at the same time, save your plant plenty of time and money in this operation!

change to Carpenter STEEL — Matched Tool and Die Steels

. . . modern die steels engineered to meet *today's* requirements!

Export Department: The Carpenter Steel Co., Port Washington, N. Y.—"CARSTEELCO"

With Competition Keynoting 1954, Watch the Automakers for . . .

OUTPUT— Transition from sellers' to buyers' market clouds forecasts heavily. Estimates center on 5-5.5 million passenger cars, about a million trucks. Possibility that the hard sell could maintain 1953 levels is not discounted; however, some makes should better 1953 output next year, others will suffer setbacks. Industry output will be off a little more than 10 per cent.

PRODUCTION—Don't be misled by a hot start in 1954 compared with controlled 1953. Resumption of prewar seasonal production patterns will be strongly evident in 1954 with 55 to 60 per cent of output during the first half. Second half drop-off, if it comes, will be met with production cutbacks, not blitz selling, say most. First-quarter output could be record high.

SALES—Clearing out of postwar deadwood dealerships is already begun, will become marked as 1954 moves along. Sales training programs, heavier advertising, some price cuts will help dealers produce. Those grown too fat will get the ax.

MANUFACTURING—Less jobbing and more manufacture in parent companies to consolidate for competition should be evident in 1954. Automakers will be out to take the foam off costs wherever possible. That means more automation, accelerated research in plastic dies and other cost cutters. Materials and methods all along the line will get a new look.

ENGINEERING—Emphasis on deluxe equipment for low-priced models with greater performance and show-car features for all models will help make the buyer come across, automakers figure. Watch for midseason improvements already in the works if sales start to lag, early fall introduction for faltering makes.

MERGER— Outlook for the thinner independents grows darker despite brave talk. Automated tooling bills put the small fry at a disadvantage. Only mutual aid can remedy, then perhaps only temporarily. Watch for merger or a mutual parts supply program from the independents in the year ahead.

SUMMING UP—1954 will be a no-holds-barred return to competition in the auto industry. That means winners and losers for there aren't enough chairs to go around. Those ready will improve their sales position. Those who aren't will be left standing if the music stops, as many expect about midyear.

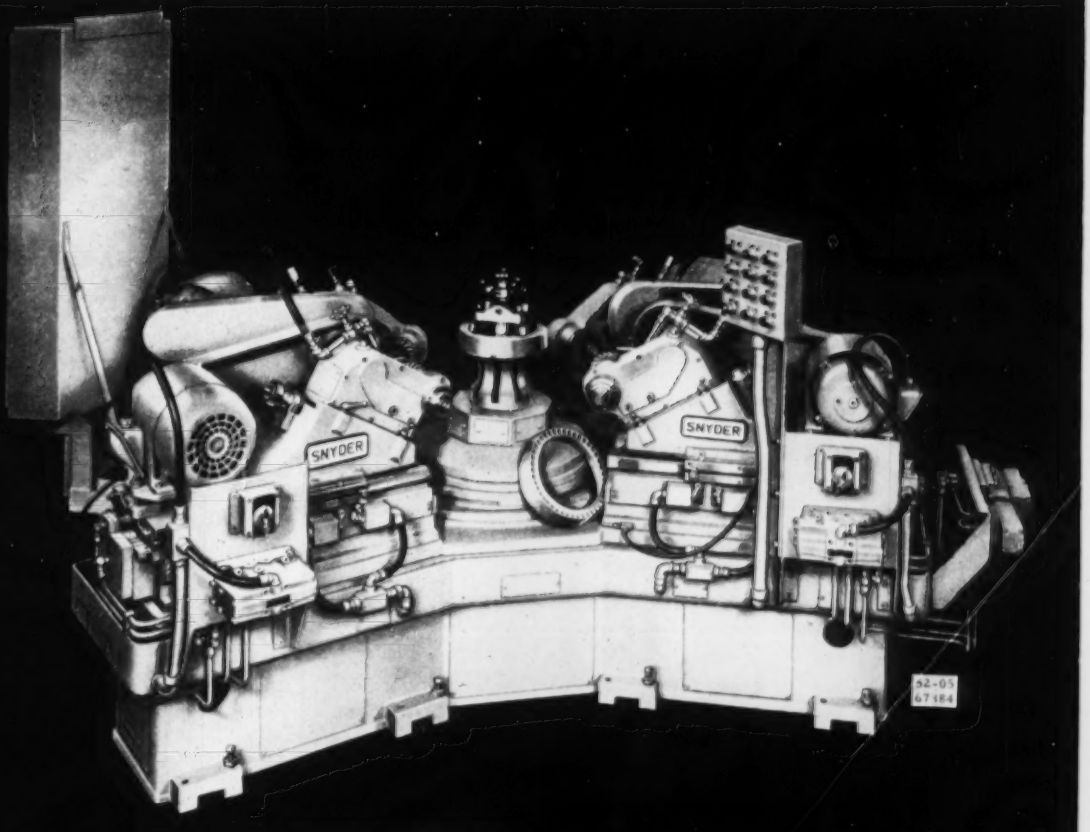
Automakers Get Set To Woo And Wow the Reluctant Buyer

GRANTED their final decree from controls in mid-1953, the automakers went on a production bender that left them with a heavy year-end hangover. Despite steaming cups of black buyer-resistance, there is still considerable doubt whether they will sober up in 1954.

Bad Start? — The alarming aspect of the situation lies in the fact that competition not only lies ahead for the auto industry, it has been back for almost six months. The aptitude for competition demonstrated by the automakers thus far has not been promising. Pointing an accusing finger at their competitors, the major auto companies have blithely dumped an unprecedented load of cars on their dealers to be disposed of in any way possible. The result of this expedient on the attitude of consumers who have learned to expect discounts may well have an extremely deleterious effect on the auto industry in 1954.

The situation is the more unfortunate because good case can be made for 1954 as a top auto-production year. Liquid assets of individuals are high. Tax reductions and easing credit restrictions are expected to boost purchasing power further. Standards of living have risen.

A Lot Needed—As to the need for autos, the record output of 6.6 million cars in 1950 should nor-



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"... I believe American business is headed toward another good year ... competition in the automobile industry will intensify, but all signs indicate that the market will continue to be strong."

HARLOW H. CURTICE
president, General Motors Corp.

"... 1954 will be the most critical sales year of the next five for the auto industry ... It will be neither a sellers' market nor a buyers' market, but a selling market in which demand must be created."

JAMES J. NANCE
president, Packard Motors Corp.

mally be up for replacement next year. Over 12 million prewar cars are still on the highways (over 50 per cent of cars on the road are pre-1949). Seventeen million American families do not own automobiles (37 per cent of the nation's farms are without passenger cars and 66 per cent do not have trucks). Further, four out of every five new vehicles produced merely replace those scrapped during the year.

But the purchase of a car or truck is deferrable and the demand therefore is potential rather than active. The buyer must be given sound motivation to buy a car rather than a "one cent sale" expedient which can only infer that if he waits long enough the price will be two for one cent. There is little doubt that 1954 can be bulldozed into a 5.5-million-unit figure with only cursory effort at selling. The real question is whether intelligent cultivation of the market and the groundwork for a sound future will be laid by the auto industry in the year ahead.

Jostling—A few factors mitigate against this belief. Ford and Chevrolet are making no bones about their coming production race which has already seen fangs bared. General Motors divisions will be free of corporation production controls for the first time since 1941 and are already eyeing one another in a none-too-brotherly way. Chevrolet's increase in Bel-Air production, for example, could come at the partial expense of Pontiac. Buick reportedly plans a new model which is aimed directly at the Oldsmobile class.

Despite the menacing noises, competition in the auto industry is a normal condition which only becomes dangerous through indiscretion. The highest productive capacity in the history of the auto industry coupled with a transition to a buyer's market could make 1954 a production race with throat and price-cutting sufficient to undermine the morale of the whole economy.

Good Signs—But there are several indications that a semblance of more discreet management and far-sighted growth will return to the auto industry in 1954. Significantly, auto men recognize that production will be more closely governed by demand in 1954 than in almost any other year since the end of World War II. Hence, production may return to prewar seasonal patterns. Auto men want to minimize such patterns, and most of them recognize that there's a limit to dealer-dumping. Chrysler and Nash both have readjusted output already to get in step with dealer orders. On the other hand, automakers are acutely conscious that dealers have enjoyed a period of minimal competition and must be re-educated on how cars are sold in a competitive market. The job is to stimulate demand during seasonal lulls.

To this end, selling schools for dealers and salesmen are being announced by virtually every auto company. Salesmen will be taught the lost art of selling in clinics and through films. In some cases they will be brought to Detroit or trained at zone offices by field representatives who have themselves undergone training. Packard plans to use student participation in simulated sales situations including the almost forgotten telephone contact, showroom contact and road demonstration. The training program was worked out for Packard by Poetzinger, Dechert & Kielty of Chicago which did much work for James Nance's former Hotpoint charge.

Hotpoint Carry-over — Another portion of the Packard selling program which may well be used by other auto companies is graphic material for the sales room. One is a box which a salesman can insert in the car's trunk to show competitor's leg room, visibility over the hood, windshield area, hip room and car length. Techniques of this sort worked for Hotpoint in the appliance field which has seen two competitive years since the end of World War II, and Mr. Nance feels confident that they will aid Packard.

An infinite variety of other selling devices and attention getters limited only by the imaginations of very imaginative men can be expected to appear to lure you into the showroom and assist in nailing you when you get there. But in addition to the increased advertising and selling tempo in the year ahead, engineers will be hard at work giving the salesmen a more competitive product to sell.

Deluxe Deal — One outstanding example is the quantity of deluxe accessories for low-priced cars. Offered for the first time on some or all low-priced cars in 1954 are power windows, power seats, power brakes, power steering and even air conditioning on the slightly higher priced Pontiac. These devices are offered on the theory that

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for DE VILBISS

Here's Why .....

The unusual combination of cored openings, decorative effects and engraved lettering called for in this part were best obtained as a ZINC Die Casting. Furthermore, it is important that the part be highly corrosion-resistant and of sound structure to withstand up to 300 pounds per square inch of air pressure without a bubble of leakage. No other metal or method of fabrication could provide all of these physical characteristics at a cost comparable with ZINC Die Casting.

This casting – the regulator head for the pictured De Vilbiss air transformer, which feeds compressed air to spraying and other equipment with a high degree of uniformity and accuracy – requires an absolute minimum of secondary operations prior to assembly, thanks to the unusual castability of ZINC. And the as-cast surfaces of this casting are plated easily and economically.

The De Vilbiss air transformer is just one of countless products made better with ZINC die castings. Ask us – or any die casting company – for a copy of our booklet "The End Uses of Zinc Die Castings" which has 48 pages of successful ZINC die casting applications.

ZINC IS FREELY AVAILABLE

The American Zinc Institute has issued a new folder which gives the facts on why "zinc supplies will continue to be sufficient to meet both near and long range requirements". Ask us for a copy.

The New Jersey Zinc Company
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a car purchaser would rather have a less expensive car with the works than a higher-priced car stripped. One automaker is reportedly holding back an air conditioning unit for spring introduction on one of the very lowest-priced cars.

Although less than 115,000 new cars built in 1952 were equipped with power brakes, the total in 1953 reached 550,000. In 1952 only about 200,000 cars were equipped with power steering while over 600,000 were so equipped in the first nine months of 1953 alone. Automatic transmissions were installed in 2.5 million 1953 passenger cars. The expected output of all of these devices will be still higher in 1954, increasing the "extra" equipment market.

More Horsepower—A couple of new V-8s should make their bow before this year is out in 1955 models, with horsepower continuing to move up. Styling will continue its trend toward lower overall height with wrap-around windshields in increasing number reported coming on 1955 jobs. New bodies will highlight the Chrysler products, Ford products, Pontiac and Chevrolet in 1955, probably to be introduced in late fall.

Although earlier introductions will be in vogue to stimulate sales, watch for a few companies to bring out new models in the spring. Among a few expected are the Nash NKI and Rambler four-door convertible with indications that a Studebaker convertible may also be forthcoming before the balmy breezes blow. Mechanical modifications, new accessories and deluxe body treatments also may be introduced in the spring to spur any sales lag.

Competitive Spur — Manufacturing developments and improvements will undoubtedly appear on a scale to rival product development. Always important, manufacturing costs will be given even closer scrutiny as competition stiffens. Token price reductions have already been announced on a few 1954 makes and costs must be reduced accordingly. Already taken out of the cost picture in 1954 without a slide rule being lifted is conversion steel which Nash, for example, spent a whopping $10.2-million for in 1953.

Continued improvement in plastic dies, automation and quality control can be expected in 1954 with a strong indication that many companies are further along in these technical developments than they care to confess to their competitors. Automatic gaging is making rapid advancement in the auto industry and should continue to spread in the year ahead. Increased use of modified standard machine tools with automation links is considered to be a trend in the auto industry.

On the Increase — Precision molding in the auto industry is on the increase. Crankshafts, camshafts, valves and other parts lend themselves well to shell molding with high precision and a minimum time required to finish the part. Diecastings find themselves adapted to intricate parts like automatic transmission oil-valve passages and even large parts like torque converter housings. Usage of powder metal parts continues to increase, for as in the case of precision castings machining time is eliminated or markedly reduced.

Supplies of nickel are expected to be normal by February and will be most noticeable in a return to prewar quality in chrome-plated parts. Automakers aren't anxious to return to expensive alloys where they aren't absolutely necessary, however. Most moldings have been designed within the formability limits of chrome stainless, and no swing back to the 300 series is expected. Nickel has been completely eliminated from camshaft iron by one manufacturer, and the nickel content of ring and piston gears has been substantially reduced. Better temperature and atmosphere control in heat treating is returning the low-carbon grades to many applications because of their lower cost.

Less Jobbing — Noticeable, too, will be a trend toward more manuture of components by the auto companies which they have heretofore jobbed out. A good example is the report that Chrysler will begin manufacturing its own power steering unit replacing the job now made by Gemmer Mfg. Co.

Diversification of the auto industry will continue. Obvious cost advantages accrue from shipping nested auto parts to assembly plants as against shipping the bulky completed cars. Assembly plants can be expected to continue to spring up in strategic market areas while component parts will be built where labor and material supply advantages offset freight charges on the finished parts.

Newer Plants—Modernization of plant and equipment will assume high priority on the list of goals for some automakers. Many plants

"... The potential market for motor vehicles is excellent ... But there is going to be competition for the favor of the automobile buyer ... The results of this competition can be a dynamic force driving the economy to greater heights than ever before."

L. L. COLBERT
president, Chrysler Corp.

"... Automobile factories must limit their production to that volume of cars which with hard intelligent selling can be sold at a profit by retail dealers ... There is nothing about the present situation that cannot be cured by intelligent action."

PAUL G. HOFFMAN
chairman, Studebaker Corp.

(Advertisement)

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COPPER ALLOY BULLETIN

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The Production Control Quantometer can make a complete analysis of copper-base alloys in approximately four minutes as compared to several hours by the chemical method.

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Uniform high quality of brass mill products is essential to modern metal-working practice, as cost of operation and salability of end product often depend upon it. Strict laboratory controls protect users of sheet, rod, wire, and tubing; help economical production; and govern uniformity.

Scientific tests are made of incoming raw materials, castings analyzed, and outgoing finished orders checked. This procedure assures conformity with specified composition, dimensions, temper, and other physical properties.

Quantometer Speeds Analysis

How the Bridgeport Laboratory keeps abreast of up-to-date testing methods is well exemplified by the Production Control Quantometer. With this new, automatic, electronic spectrometer, alloy composition is determined in a matter of minutes. Samples obtained from the molten stream during pouring are speedily delivered to the Quantometer room by a specially designed, pneumatic tube system.

A small test sample casting is machined for a smooth surface and placed on the platform of the Quantometer where it receives an electrical discharge. The resulting gaseous vapor of the melted metal has a luminosity which is broken up by a grating into wavelengths of light. These rays strike photomultiplier tubes arranged to receive light corresponding to the elements desired in the analysis. These tubes develop voltage which is registered on a strip chart recorder and converted into terms of calibrated concentrations by means of a calculating device. The complete cycle of machining, loading, calculating, and recording requires approximately 4 minutes. This remarkable instrument is operated in an air-conditioned room with temperature and humidity controlled to assure accurate performance.

With many thousands of pounds of metal being cast daily, speed is essential in testing composition so that any offmixture can be detected and corrected immediately.

Analyses are made of every alloy cast and other physical tests such as hardness, grain size, tensile strength, yield strength, elongation, are made when required.

Corrosion Studies Beneficial

Corrosion is probably the greatest enemy of metals. A specially trained staff studies the effects of corrosion so that more suitable metals can be recommended for longer service life. Electro-chemical studies are made in the laboratory, along with alternate immersion, total immersion, impingement and stress corrosion testing in acid, base, salt and organic solutions and gases. Field tests and examinations of corroded tubes are also performed.

Research Very Important

Bridgeport's consistent research program comprises studies of new processes and methods of production as well as possible new products; development of new alloys and improvement of old ones; comparison testing, etc., and study of the fundamentals of forming operations.

Experimental work also covers welding, machining, strain analysis, heat treatment, as well as evaluations of coolants, lubricants and metal cleaning.

Technical Service

Our experienced technical service staff can help customers on their metal problems in many ways:

1. To make sure that the correct alloy and temper are used on standard items.

2. To improve existing products by using stronger, more corrosion-resisting alloys.

3. To help designers to specify the correct copper-base alloys when bringing out new products.

4. To help reduce finishing costs by recommending the correct temper or grain size for minimum polishing effort.

5. To help reduce machining costs by recommending the proper free machining alloys.

6. To increase service life of tube installations by recommending more corrosion-resisting alloys.

If you have not yet used Bridgeport's laboratory controlled mill products, contact our nearest District Office. Write for your copy of Bridgeport's "Technical Handbook," using your company stationery. (1172)

CAUSES OF CORROSION

This article is one of a series of discussions by C. L. Bulow, corrosion metallurgist of the Bridgeport Brass Company.

COPPER AND COPPER ALLOYS vs. SODIUM CHLORIDE SOLUTIONS (Cont.)

Effect of Dissolved Oxygen

Much information is available regarding the effect of oxygen or aeration on the corrosion of copper and copper alloys in sodium chloride solutions. Rawdon and Groesbeck's[1] weight loss data for 1 N sodium chloride solutions recalculated in terms of penetration in inches per year (ipy) are given in Table III. Their data show that aeration of the sodium chloride solution increased the corrosion of the totally immersed copper and copper-nickel alloys from 1.8 to 7.7 times the rate in unaerated solution. It should be noted that these values, along with those given in previous issues of this column, are relatively low as compared with other metals.

TABLE III

Corrosion of Copper and Copper Nickel Alloys in 1 N Sodium Chloride Solutions and Spray

Alloy	Corrosion Rate
Spray, 30 days at room temperature	
Copper	.000370 ipy
70% Copper, 30% Nickel	.000052 ipy
55% Copper, 45% Nickel	.000052 ipy
Alternate Immersion, 24 hours at room temperature	
Copper	.00065 ipy
70% Copper, 30% Nickel	.00007 ipy
55% Copper, 45% Nickel	.00037 ipy
Total Immersion, 96 hours unaerated at room temperature	
Copper	.00075 ipy
70% Copper, 30% Nickel	.00034 ipy
55% Copper, 45% Nickel	.00024 ipy
Total Immersion, 96 hours aerated at room temperature	
Copper	.00580 ipy
70% Copper, 30% Nickel	.00062 ipy
55% Copper, 45% Nickel	.00082 ipy

Refrigerating Brines

Sodium chloride or calcium chloride refrigerating brines are very corrosive when oxygen is present, particularly in bimetallic systems such as a steel tank with copper or brass piping. The corrosiveness of brines (containing up to 20% of either chloride) can be inhibited substantially through the use of sodium dichromate. The addition of sodium dichromate or chromate and adjustment of the pH to 8.0—8.5 is usually recommended[2] for the protection of steel, iron, etc. This may even inhibit the dezincification of yellow brass in these brines and has no adverse effect on copper, red brass, bronzes, and other copper alloys.

Roetheli and Cox[3] found that sodium dichromate in .002, 0.05, 3.5, and 22% sodium chloride solutions protected copper and brass to some degree; iron and steel were protected in all the solutions investigated between 20-95°C when enough sodium dichromate was present.

(1) *H. S. Rawdon and E. C. Groesbeck, Bureau of Standards, Technical Paper #367, pp. 409-446 (1928).*

(2) *Refrigeration Eng. 14, 173-182 (1927).*

(3) *B. E. Roetheli and G. L. Cox, Industrial and Engineering Chem. 23, 1084-1090. (1931).*

NEW DEVELOPMENTS

This column lists items manufactured or developed by many different sources. None of these items has been tested or is endorsed by the Bridgeport Brass Company. We will gladly refer readers to the manufacturer or other sources for further information.

Automatic Vacuum Lift is said to handle any nonporous metal sheets up to 40" x 40" at a rate of one to six sheets per minute. Machine will pick up at any level from floor to 36 inches high and is adjustable through this entire range and adjustable through 180 degree turn to lay sheet exactly into position for repetitive operations. Lifter consumes about 60 cu ft. of air per cycle. **No. 1355**

Motor-Mounted Belt Sander does not need to be anchored to bench. Unit has semi automatic, self leveling belt tension adjuster and is reported to use belts from 42 to 46 inches in length. Has reversible tilting worktable and is portable and well balanced. Uses 1 inch width belts. **No. 1356**

Thread Restoring Tool is said to be useful on damaged or deformed external threads without reducing root and outside diameters. Unit is used like a file, a few passes across threads removing burrs and deformed metal. Tool is available in National Coarse or National Fine threads with eight thread sizes on each tool. **No. 1357**

Bench Type Lapping Machine weighs 150 lbs. and is mountable on any sturdy bench. Machine uses figure 8 motion at four speeds from 250 to 1000 ipm. Serrated or smooth 8 x 12 inch lap plates of cast iron are used and said to be easily interchanged. Unit has brackets in base for hold down devices for multiple piece lapping or for lapping of angled surfaces. **No. 1358**

Shock Mount is said to be a vibration and noise isolator for equipment applying static loads of 15—200 pounds per unit at frequencies above 20 cps. It provides from 70% 90% isolation at 30 cps (1800 rpm) for motor-generators, grinders, high speed compressors, fans, etc. **No. 1359**

Cutting and Grinding Fluid Selector helps determine which fluids can be used for various machining operations. Every machining operation for brass, bronze, copper, aluminum, steel, stainless, magnesium, and monel is said to be indicated, along with machinability ratings of the metals. **No. 1360**

Research Metalworking Machine is intended for experimental and test laboratories and is said to reproduce all the movements and speeds expected of any machine tool. Machine is useful for 50 operations including sawing, boring, grinding, drilling, milling, slotting, taper turning, etc. 24 spindle speeds, 65-2800 rpm are available. **No. 1361**

Portable Power Hack Saw is reported to cut up to 3-in. diameter stock at any angle from 45 to 90 degrees. Blade operates in any position without weights. Work vise clamps to stanchion or pipe for support. Unit has adjustable pressure for different materials and an automatic shut-off. Blade speed is 115 strokes per minute. **No. 1362**

BRASS, BRONZE, COPPER, DURONZE, NICKEL SILVER, CUPRO NICKEL
BRIDGEPORT BRASS
BRIDGEPORT BRASS COMPANY, BRIDGEPORT 2, CONN. • ESTABLISHED 1865
Mills at Bridgeport, Connecticut, and Indianapolis, Indiana • In Canada: Noranda Copper and Brass Limited, Montreal
Warehouse Service with Slitting Facilities in Principal Cities (Advertisement)

in and around Detroit are multi-story buildings 20, 30 or more years old.

Automobile manufacture today is markedly different than it was twenty years ago. Sprawling one-story plants with specialized automated equipment that can be revised or modified every few years is the pattern. But the efficiency of specialized equipment imposes a burden of volume production if unit cost is to be kept low and competitive.

Independent Troubles—For that reason the outlook for the independents is growing steadily more dim. Through the first ten months of 1953, the independents secured only 9.4 per cent of total domestic registrations as compared with 13.7 per cent for the first ten months of 1952. And it seems likely that the share of the 1954 market going to the independents may well be further reduced as competition continues to stiffen.

James J. Nance observes that it has always been his aim to develop Packard into a more attractive bride. Just after his marriage to Willys, Edgar F. Kaiser told STEEL that he would not be averse to Packard bigamy to fully bracket the auto market. George W. Mason and A. E. Barit of Nash and Hudson respectively admit that they have discussed merger but that no conclusions have been reached. Mr. Mason does suggest that something short of merger might be a possibility, such as sharing certain production parts.

For Mergers—Aside from increasing competition, several factors combine to favor merger or mutual aid at this time. The swing to V-8's finds all the independents except Studebaker yet to make the change and facing a high tooling bill. Packard must establish a new source of supply for the completely new body shell it is reported to have coming up in 1955. There are some indications that Hudson's major facelift this year has not sparked sales as had been hoped.

It takes time to design, test and tool for auto components. The time of the independents is running out, and it is more than likely that 1954 will see some drastic action among the smaller giants to entrench themselves in the sweeping tide of competition.

"...Our company will undertake an aggressive campaign internationally to cut costs and be better prepared for the competition ahead . . . There is much to be accomplished by way of closer co-operation between independent automakers."

GEORGE W. MASON
chairman and president, Nash-Kelvinator Corp.

"...We can move ahead boldly through better management and harder selling... or slide backward to a controlled economy, restricted production and a kind of economic plateau . . . It is our business to make trends, not follow them."

ERNEST R. BREECH
executive vice president, Ford Motor Co.

"...All types of business today face the need to readjust from the war-inflated period to a more normal and competitive period. The making of these adjustments assures a more stable and healthy economy."

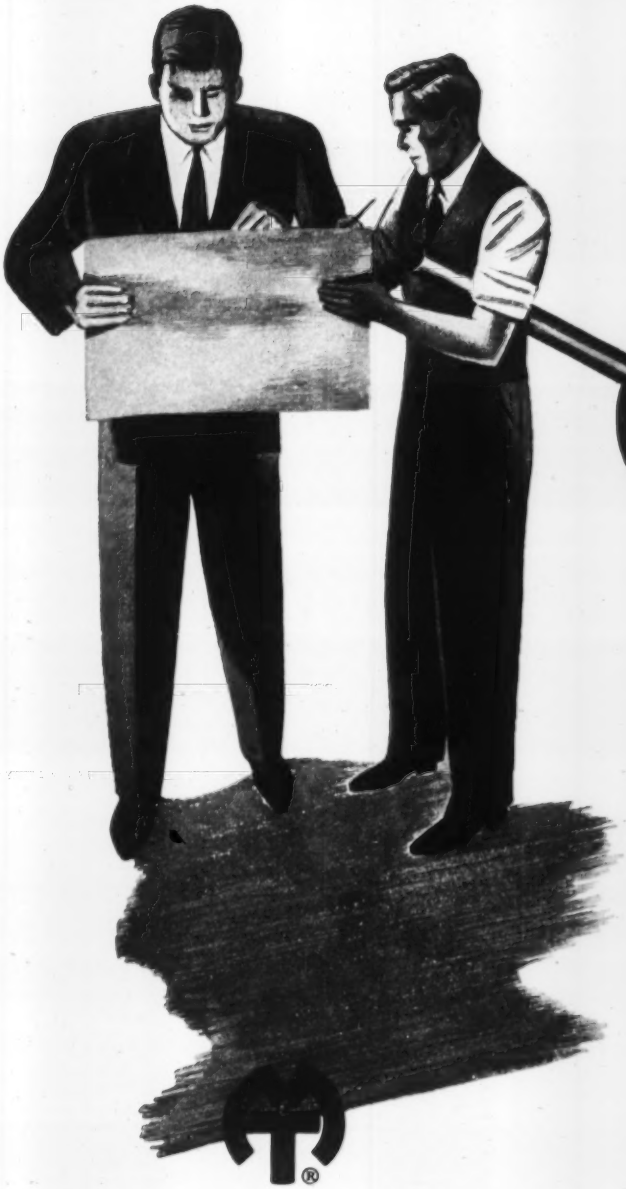
A. E. BARIT
president, Hudson Motor Car Co.

Second Best—The year of 1953 has seen production of motor vehicles at the second highest level in history as the auto industry maintained a record average employment of 930,000. U. S. auto plants turned out an estimated 7.3 million motor vehicles during the year, topped only by 1950 which saw 8 million units produced. The 6.1 million passenger cars was considerably above the 5.3 million most observers forecast about this time last year and wholesale value of motor vehicle production reached a new high of almost $11.5 billion.

Estimates of the experts this year are interesting. Few companies see a diminution in their own sales but see a drop-off for the industry. Most observers figure that the output of the industry will be from 5 million to 5.5 million passenger cars while the truckers who have topped the million mark for seven consecutive years seem competent to turn the trick again. If everybody's year looks pretty good, it is conceivable that 1954 could see a new record set in auto production rather than a drop-off.

Pivotal — This much is sure—competition will be back in the auto industry with a vengeance in 1954. Unless the automakers set out to cultivate new prospects rather than fighting over the available market, there aren't going to be enough chairs to go around. The year will be extremely interesting because of its pivotal constructive and destructive aspects. James J. Nance has called it "the type of turning point that comes only once in a generation."

The suspense is heightened the more because as the auto industry goes, so, in all probability, will go the economy.



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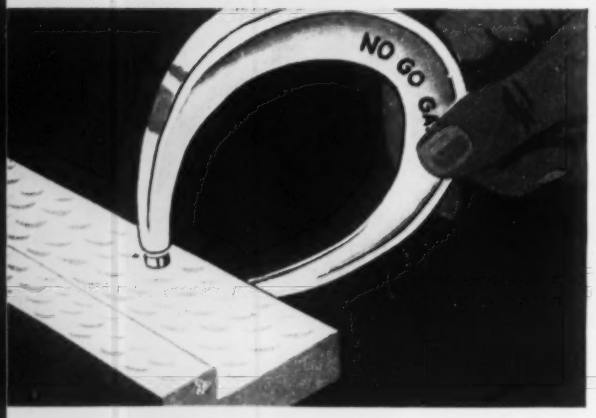
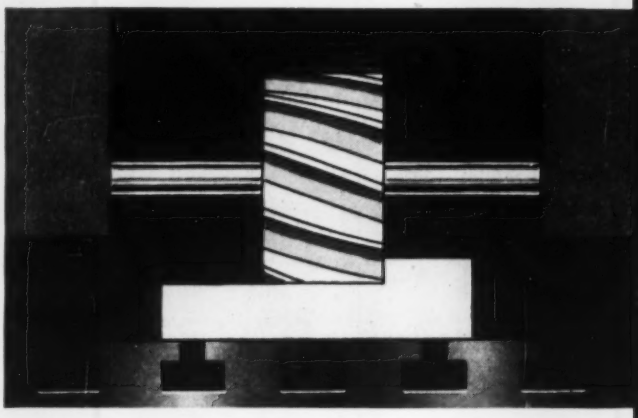
HOW TO END DAMAGED WAYS, PRODUCTION LOSSES

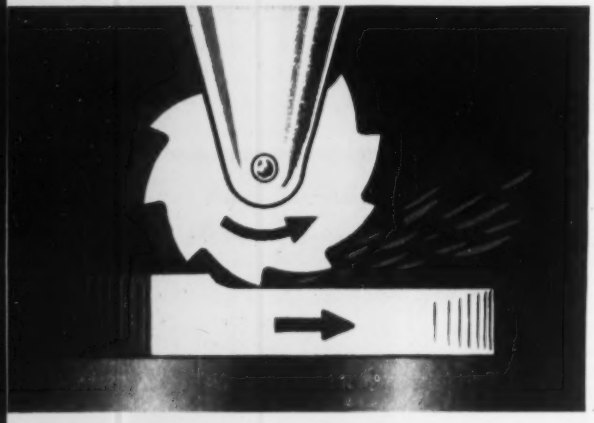
Sunoco Way Lubricant Stops "Jumpy Table"



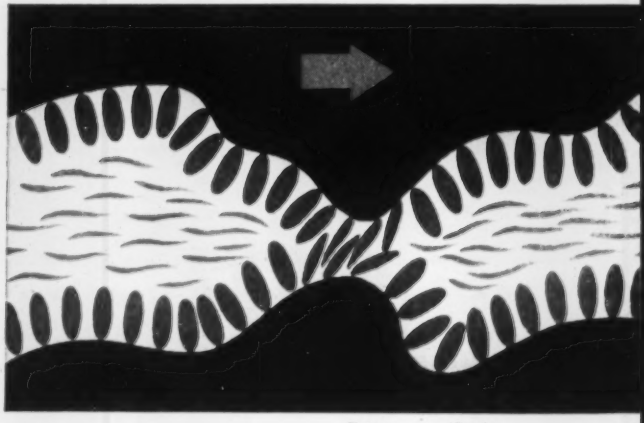
Tool chatter and jumpy table are machining headaches. Too often they cause poor surface finish, failure to hold tolerances, production losses.



Tool chatter is a result of a lack of rigidity in either the machine or the set-up. It is a mechanical problem and no lubricant can lick it.



Jumpy table is a stick . . . slip . . . stick . . . slip action of the table. It is a lubrication problem. Though just as damaging as tool chatter, it is not always detected when the cause of poor surface finishes.



Extreme magnification

Sunoco Way Lubricant cures jumpy table. It contains special compounds that form a film, like the nap of a rug, on the sliding surfaces and minimize the force of both static and kinetic friction.

Why take a chance of damaging your ways? These integral parts of the base casting for your machine are difficult to refinish and costly to replace. For information about Sunoco Way Lubricant, call a Sun office or write SUN OIL COMPANY, Philadelphia 3, Pa., Dept. S-1.

INDUSTRIAL PRODUCTS DEPARTMENT

SUN OIL COMPANY

SUNOCO®

PHILADELPHIA 3, PA. ◆ SUN OIL COMPANY LTD., TORONTO & MONTREAL

MEN OF INDUSTRY

WALLACE R. PERSONS
. . . heads Emerson Electric Mfg.

WILLIAM J. DURING
. . . Precision Castings president

DONALD L. HARWOOD
. . . Fairbanks, Morse gen. purchasing agent

Wallace R. Persons was elected president and a director of **Emerson Electric Mfg. Co.**, St. Louis. He succeeds **W. S. Snead,** formerly president and chairman, who continues as chairman of the board. Mr. Persons was vice president and general sales manager of Lincoln Electric Co., Cleveland.

Edward C. Logelin succeeds **Arthur C. Wilby,** retired, as vice president, **United States Steel Corp.**, in Chicago. From 1943 to 1946 Mr. Logelin was principal assistant in New York to J. Carlisle MacDonald. He has since served as director of public relations at Chicago.

W. Randle Mitchell, controller of **American Pulley Co.**, Philadelphia, was in addition made vice president. **H. Merrill Bowman** was also elected a vice president and will take general charge of sales and advertising in the near future.

Thorne F. Korlegard was elected president of **United Carbon Co. Inc.**, Charleston, W. Va., and its subsidiaries, succeeding the late **Oscar Nelson.** Mr. Korlegard was formerly first vice president. **Oscar Nelson Jr.,** executive vice president, was elected chairman of the executive committee.

Edward M. Siegel was elected vice president, **Titan Industrial Corp.**, New York.

Precision Castings Co. Inc., Syracuse, N. Y., elected **William J. During** president to succeed **Arthur G. Chase,** who was re-elected chairman of the board. Mr. During has been executive vice president, and during his 31 years of association with Precision has held positions as chief engineer, vice president and general manager.

Heyl & Patterson Inc., Pittsburgh, elected **H. R. Edelman Jr.** president to succeed **T. P. Butler,** now chairman of the board. Mr. Edelman was formerly executive vice president and is succeeded in that position by **E. W. Kahle. J. F. Page** was elected secretary-treasurer.

Reuben N. Trane has resigned as director and chairman of the board of **Trane Co.**, Chicago, due to ill health. **Frank Hood,** formerly treasurer, becomes chairman, while **Wayne Hood,** a vice president, assumes the additional duties of treasurer.

James McKay Jr., sales engineer, was promoted to sales manager of **Lyco Machine Works,** Oakland, Calif.

E. W. Bliss Co., Canton, O., appointed **L. G. Jones** manufacturing manager of its Canton Division. He was previously with General Electric Co.'s Hanford Works.

Donald L. Harwood was made general purchasing agent for **Fairbanks, Morse & Co.**, Chicago. Associated with the company since 1926, he has been manager of materials and schedules at the Beloit, Wis., Works since 1951.

Flexible Steel Lacing Co., Chicago, elected **Milton B. Beach** president to succeed his brother, the late **H. J. Beach.** For the last 22 years Milton Beach has been vice president in charge of production. He also supervised engineering, design and research on metal fasteners for conveyor and transmission belts.

L. L. Garber, vice president, H. K. Porter Co., Pittsburgh, was elected a director, vice president and general manager of **Alloy Metal Wire Co.**, Prospect Park, Pa., newly acquired division of H. K. Porter. In his new position, Mr. Garber will be in charge of all phases of the division's operations. Formerly general manager of Porter's Hinderliter Tool Co. Division, Mr. Garber has been with the company four years. During that time he served in various management and production capacities.

Dr. Paul Schwarzkopf, president of American Electro Metal Corp., Yonkers, N. Y., was elected to the board of **George Cohen (Sinteel)**

W. O. VIERY
. . . U. S. Steel Products sales post

JOHN MONSON
. . . CF&I blast furnaces supt.

WAYNE G. NORTON
. . . Optical Gaging gen. sales mgr.

Ltd., London, England, a new company which will introduce to England the production of ferrous structural parts from powder.

W. O. Viery was appointed manager of commercial sales for U. S. Steel Corp.'s **U. S. Steel Products Division**, Los Angeles.

H. M. Krengel was named general manager of **Ravenna Arsenal Inc.**, Ravenna, O., a subsidiary of Firestone Tire & Rubber Co. which operates the government-owned shell and bomb loading plant. Mr. Krengel succeeds **Paul Borda**, now general factory manager of Firestone's Memphis, Tenn., plant.

Pullman-Standard Car Mfg. Co., Chicago, named **T. Y. Gehr** manager of its track equipment department to succeed **John A. Curtis**, who resigned to join Westinghouse Electric Corp.

John Monson was appointed superintendent of blast furnaces at the Pueblo, Colo., plant of **Colorado Fuel & Iron Corp.** He succeeds **R. R. Williams Jr.** who was appointed assistant manager of the CF&I mining department.

William B. Greene was made personnel manager, **Union Steel Castings Division**, Blaw-Knox Co., Pittsburgh. He was previously division safety supervisor, which duties are included in his new position.

Hugh M. Little was named a vice president of **Le Roi Co.**, Milwaukee, and **Norman J. Kimber** was promoted to works manager, Milwaukee division.

Wayne G. Norton was appointed general sales manager, **Optical Gaging Products Inc.**, Rochester, N. Y. **John A. Bernardini** was appointed assistant sales manager. **Peter W. Crump, James L. Huff** and **Robert J. Wirges** were assigned to larger sales responsibilities as special sales consultants serving Optical's customer requirements.

Ziegler Steel Service Corp., Los Angeles, appointed as sales representatives **Charles A. Tuchschmidt**, Phoenix, Ariz., for Arizona; **Donald W. Johnson**, Portland, Oreg., for Oregon and southern Washington; **Paul F. Routon**, Wichita, Kans., for Kansas and Missouri; and **Sam E. Lee**, Dallas, for Texas and Oklahoma.

Lyon Inc., Detroit, appointed **Harry J. Eynon** assistant production manager to succeed **James W. Tulloss**, recently named production manager. Mr. Eynon was formerly quality control engineer.

Earle M. Jorgensen Co., Los Angeles, appointed **Elwood M. Smith** executive vice president, **Charles Schriber** senior vice president, **George A. Day** treasurer and **John F. Watkins** secretary. **S. Monte Robinson** is comptroller.

Philip R. Freeman was appointed executive vice president and general manager of **Coulter Steel & Forge Co.**, Emeryville, Calif. He joined the company in 1950 and was made sales manager in 1952.

Donald R. McPhail was appointed materials handling engineer with the Detroit district sales office of **Pittsburgh Steel Products Co.**

Formerly with the development division, **Vern Lorch** was given a new assignment as technical specialist in the pig and ingot product office of **Kaiser Aluminum & Chemical Sales Inc.** in Chicago.

New service engineers appointed by **Simplex Valve & Meter Co.** are **E. M. Logan** with headquarters at St. Petersburg, Fla., and **J. L. Rainier**, located at Oklahoma City, Okla.

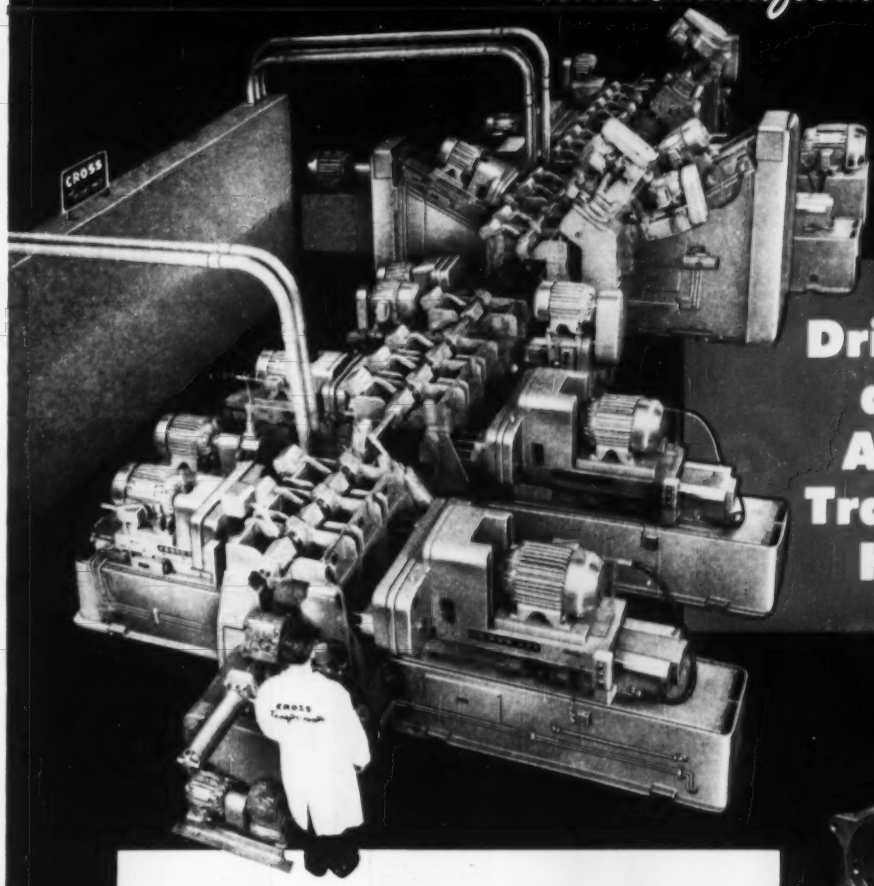
Curtis I. Kahler was made honing equipment sales engineer to cover the midwest and eastern territories for **Barnes Drill Co.**, Rockford, Ill. He was formerly with Bay State Abrasive Products Co. He will have offices at 6560 Epworth Blvd., Detroit.

R. M. Wilson was appointed plant manager of **Murray Corp. of America's** plant in Scranton, Pa. He succeeds **J. D. Cantwell.**

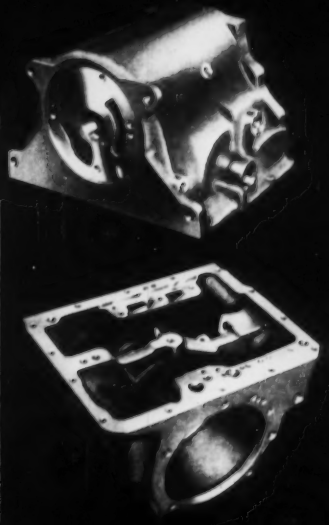
James H. Forgie, safety engineer, mining division, **Armco Steel Corp.**, Middletown, O., retired. He is succeeded by **Alex Kelemen.**

Arch R. Smith was named vice president and general manager of the Grand Rapids, Mich., branch of

Another Transfer-matic by Cross



Drills, Reams and Taps Automatic Transmission Housings



- ★ 29 stations.
- ★ 78 operations—30 drilling, 12 chamfering, 4 end milling, 3 counterboring, 14 reaming, 15 tapping.
- ★ 100 pieces per hour at 100% efficiency.
- ★ Automatic 90° indexing of part in station 14 for drilling sides and top in subsequent stations.
- ★ Pre-set tools and Cross Machine Control Unit with Toolometers for programming tool changes.
- ★ Complete interchangeability of all standard and special parts for easy maintenance.
- ★ Other features: Automatic transfer from station to station; hydraulic feed and rapid traverse; individual lead screw feed for tapping; hardened and ground ways; gravity operated cam clamping; J.I.C. standard construction; built-in chip conveyor.

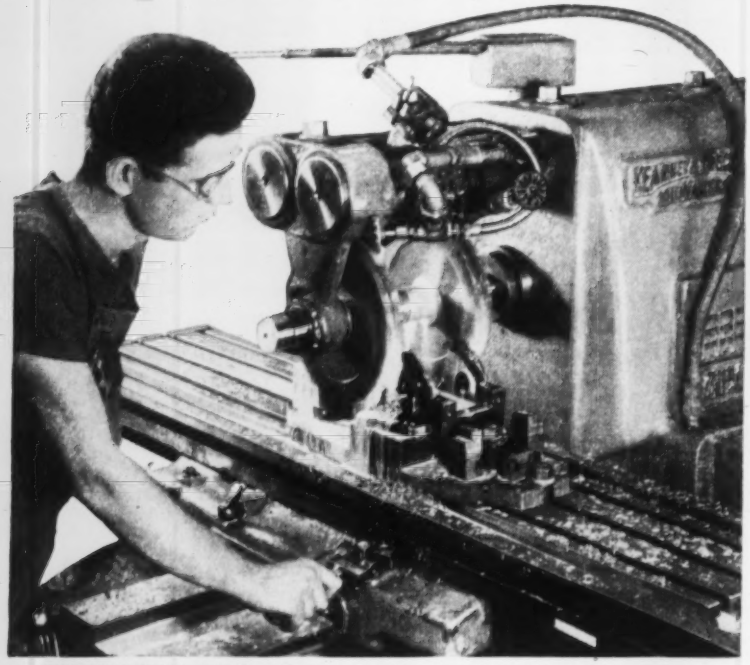
Established 1898

THE CROSS CO.

DETROIT 7, MICHIGAN

Special MACHINE TOOLS

Getting right speed selection for tough forgings— no problem with a CH machine!



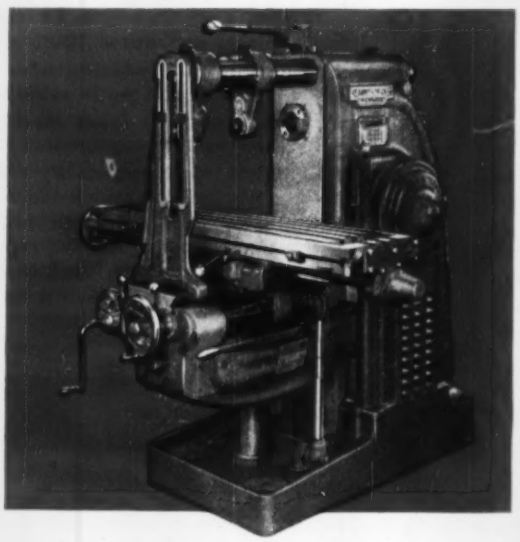
This Kearney & Trecker No. 3CH 10 hp Milling Machine mills 100 steel forgings between cutter grinds. Previous average was only 18 pieces!

PRODUCTION DATA—Job: Cablair Products Co., Culver City, Calif.—Milling 8630 Steel forging. **Machine:** 10 hp No. 3 Model CH Plain • **Cutters:** Two HSS 10½" side milling cutters (16 blades each). • **Spindle Speed:** 18 rpm • **Feed:** ½" per min. • **Depth of Cut:** 1½" max. (¾" per cutter) • **Width of Cut:** 3¼" max.

MILLING tough steel forgings might have presented a difficult production problem if this manufacturer had not owned a versatile No. 3CH miller. Tough material, the necessary speeds and size of cut combined to produce excessive cutter wear. An average of only 18 pieces could be machined before cutters had to be reground. This situation, unremedied, would have seriously restricted output and increased costs.

However, the CH miller's design provides a wide range of 24 spindle speeds (15 to 1500 rpm). By utilizing this feature, and selecting an appropriate coolant, the manufacturer *increased cutter life by over 500%!* Today, uninterrupted runs of 100 pieces are average.

This case is only one of hundreds where CH design features provide the versatility to easily meet common as well as unusual machining problems.



For details on Kearney & Trecker CH machines, contact your representative or write for illustrated brochure

KEARNEY & TRECKER MILWAUKEE MACHINE TOOLS

KEARNEY & TRECKER CORPORATION
6784 W. National Avenue • Milwaukee 14, Wisconsin

Frank Colker Co., Detroit distributor for Towmotor Corp. He has been executive vice president and general sales manager, Ready-Power Co., Detroit, which he joined in 1935.

Austin Co., Cleveland, elected **Harold A. Anderson** vice president and assistant general manager. He will have headquarters in Cleveland, moving from New York where he served as vice president and eastern district manager since 1946. **Allan S. Austin** was elected vice president and general sales manager of the company which he joined in 1928 and served as secretary since 1941. **W. G. Paton**, vice president in charge of the steel fabricating division and technical personnel and who also is assistant secretary, succeeds Mr. Austin as secretary and continues as vice president. **John N. Beckley** was named acting eastern district manager.

S. S. Jacobs, design supervisor of **American Can Co.'s** closing machine department, retired after 45 years of service with the firm. He intends to establish a consulting service on the Pacific Coast for development, design and production of food and packaging machinery.

Ernest C. Brelsford, assistant treasurer, **Thompson Products Inc.**, Cleveland, since 1950, was elected treasurer.

William H. Newton was named general sales manager of Wemco Division, **Western Machinery Co.**, San Francisco. For the last 20 years Mr. Newton has been associated with Jeffery Mfg. Co., Columbus, O.

At U. S. Steel Corp.'s **Tennessee Coal & Iron Division**, Birmingham, **William L. Smith** was appointed to the newly created position of assistant manager, commercial research division. In the comptroller's department, **Harold O. Smith** was made supervisor of salvage and reclamation, **John V. Patrick** was promoted to supervisor of stores and **Herbert F. Robinson** succeeds Mr. Patrick as chief of the property bureau. At the division's Fairfield, Ala., sheet and tin mills, **Jess C. Laughlin** was made works industrial engineer to succeed the late **Frank J. West.**

HAROLD A. ANDERSON

ALLAN S. AUSTIN

. . . executive positions announced by Austin Co.

EUGENE C. BAUER JR.

H. MONTEITH ALBERS

. . . Kensington Steel elects president, vice president

Kensington Steel Co., Chicago, elected **Eugene C. Bauer Jr.** president. Formerly first vice president, Mr. Bauer is a director of Kensington and of Pioneer Engineering Works Inc., both subsidiaries of Poor & Co. He also serves as assistant to the president of the parent company. **H. Monteith Albers** formerly sales manager, was elected vice president, assuming duties formerly handled by Mr. Bauer. **Kenneth Jensen**, who retired from the presidency, will continue with the company as a consultant.

Gordon E. Lloyd was appointed traffic manager of U. S. Steel Corp.'s **Gerrard Steel Strapping Division**, Chicago.

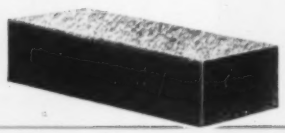
John C. Bowery, vice president and a director of **Roberts-Gordon Appliance Corp.**, Buffalo, retired after 40 years in the gas appliance division. He was in charge of purchasing and credits for the firm.

Dennis J. O'Connell succeeds **Fred Mackey** as manager of **A. O. Smith Corp.'s** landing gear division at Toledo, O. Mr. Mackey was recently promoted to vice president in charge of manufacturing. He moved to Milwaukee to serve on

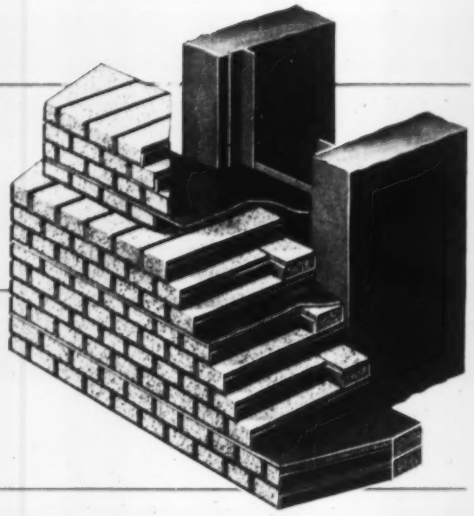
HARBISON-WALKER

CHROMEX B—an extremely hard fired chrome-magnesite refractory having unusual constancy of volume and strength at high temperatures.

METALKASE—the pioneer metal-encased basic brick possessing an unusual combination of desirable properties.

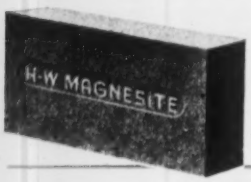


CHROMEX—a chemically-bonded chrome-magnesite brick having excellent spalling resistance.



Typical section of open-hearth furnace front wall built of METALKASE. For maximum stability steel plates are used at every fourth course vertically. These are tack-welded to steel bars which in turn extend behind the buckstay and are free to move vertically.

MAGNEX—a chemically-bonded magnesite-chrome brick—highly basic and of low spalling tendency.



H-W MAGNESITE—the standard burned magnesite refractory for more than half a century.

THERMAG—a hard burned magnesite-chrome refractory possessing enhanced physical properties.

H-W CHROME—a hard burned chrome brick especially adapted for various specific uses.

FORSTERITE—the only commercially produced magnesium-silicate brick—suited for certain particular applications.

H-W PERIKLASE—an exceptional high-magnesia brick of unusual high-temperature stability.

OTHER HARBISON-WALKER BASIC REFRACTORIES

H-W Magnamix
H-W Washington Dead Burned Magnesite Grains
H-W Washington Furnace Magnesite
H-W Special Furnace Chrome
Plastic Thermolith Batch
Thermolith and Other Cements

BASIC REFRACTORIES

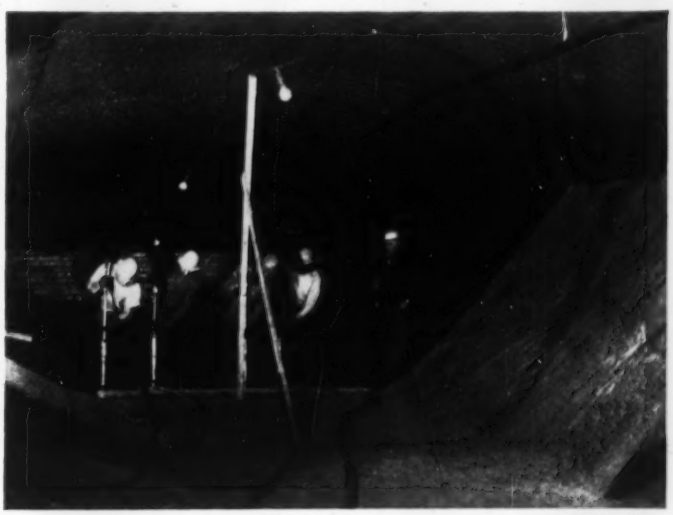
serve the varied and specialized needs for metallurgical furnaces

Shown at the left are the various brands of Harbison-Walker basic refractories. They include classes especially suited for each particular need in open-hearth and electric steel furnaces, soaking pits and various other furnaces.

Among the brands listed here are types and classes established as standards for furnaces employed in the metallurgy of ferrous and non-ferrous metals and alloys.

The superior performance of Harbison-Walker basic refractories is the result of: (1) a thorough knowledge of the requirements gained through close cooperation with producers of metals and alloys; (2) extensive and continuous original research; and (3) the use of top quality raw materials processed in modern plants under close laboratory control. Harbison-Walker uses the most up-to-date methods and equipment to insure the quality and dependable uniformity of basic refractories.

(*Above*) In basic linings of electric furnaces, METALKASE are used in the upper side walls and provide maximum resistance to spalling and to slagging action. Lower side walls and sub-bottom are built of H-W MAGNESITE. MAGNAMIX or H-W DEAD BURNED MAGNESITE forms the monolithic banks and bottom.



(*Left*) H-W MAGNAMIX bottom section in a new open-hearth furnace. Air hammers are used to ram the material into a dense, monolithic working hearth of the desired thickness and contour.

HARBISON-WALKER REFRACTORIES CO.

AND SUBSIDIARIES

World's Largest Producer of Refractories

GENERAL OFFICES • PITTSBURGH 22, PENNSYLVANIA

JOHN A. SWINT

WYCLIFFE W. WINN

. . . managers for Ford's Livonia, Mich., plant

the central staff of F. S. Cornell, vice president, general manager.

Worcester Pressed Steel Co., Worcester, Mass., appointed **Robert E. Byrne** chief engineer and **Charles T. Mooney** as production superintendent.

William H. Fellows, Chicago district manager of **Bay State Abrasive Products Co.**, was promoted to sales co-ordinator, a new position at the company's home office in Westboro, Mass. **Richard P. Brown Jr.** succeeds Mr. Fellows.

John A. Swint was made manager and **Wycliffe W. Winn** assistant manager of the Livonia, Mich., plant of **Ford Motor Co.'s** automatic transmission division. Mr. Swint managed the plant which formerly was operated by the tank division. Mr. Winn has been general manufacturing manager at the Cincinnati automatic transmission plant since 1952.

Calvin A. Burton was appointed general sales manager for **Alvey Conveyor Mfg. Co.**, St. Louis. He has been associated with the conveyor industry for 30 years in engineering, sales and executive capacities.

Richard E. Miller, general manager of **Rockwell Mfg. Co.'s** Columbus, O., plant, was appointed to the newly created position of product sales manager in charge of all saws and expendable tools sold by Rockwell's Delta Power Tool Division. **W. C. Lindley** and **E. E. Olsen** were named to special accounting posts with the company.

S. J. Sabourin was promoted to a newly created position of general factory manager of all General Motors Corp.'s **Fisher Body Division** fabricating plants. **W. S. Hull** replaces Mr. Sabourin as manager of the Patton M-48 tank plant in Grand Blanc, Mich. **J. B. Dorn,** comptroller, succeeds Mr. Hull as production manager of the tank plant, and **J. D. Brooke** becomes comptroller.

J. Lawrence Buell Jr. was elected president, general manager and director of **Formsprag Co.**, Van Dyke, Mich. He succeeds **Shepard Barnes,** resigned. Mr. Buell was with Reliance Electric & Engineering Co., Cleveland, where he served for 26 years in sales and engineering capacities and has been Detroit district manager since 1936. Also newly elected to the board is **David A. Wallace,** former president of the Chrysler Division, Chrysler Corp.

WILLIAM H. FELLOWS

. . . Bay State Abrasive sales post

CALVIN A. BURTON

. . . Alvey Conveyor gen. sales mgr.

J. LAWRENCE BUELL JR.

. . . heads Formsprag Co.

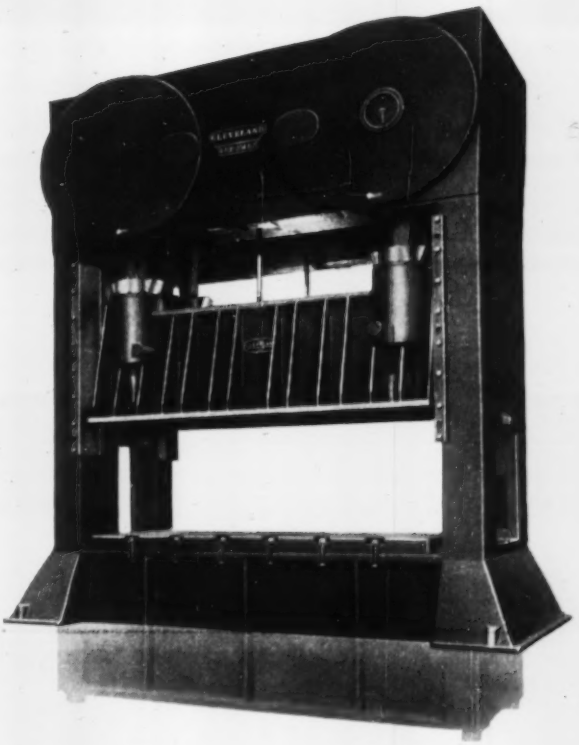
Presses are specialized too!

You'd be wasting time and energy if you tried to drive a spike with a tack hammer. It would be just as wasteful to use a giant Cleveland Four-Point Press to form a single, small stamping.

That's why we make 11 types of Cleveland Presses. Each type is available in a wide range of sizes and capacities.

If you're interested in stepping up production economy, let a Cleveland engineer study your particular needs. Follow his recommendations and you'll get the "right" press for utmost efficiency when you buy a Cleveland. Write or call today!

A-8543



CLEVELAND FOUR POINT PRESS 600-TON CAPACITY—40" stroke, 20" adjustment, 75" shut height, bed and slide area 102 x 204".

THE CLEVELAND PUNCH & SHEAR WORKS CO. U S A

THE CLEVELAND PUNCH & SHEAR WORKS COMPANY

CLEVELAND 14 • OHIO

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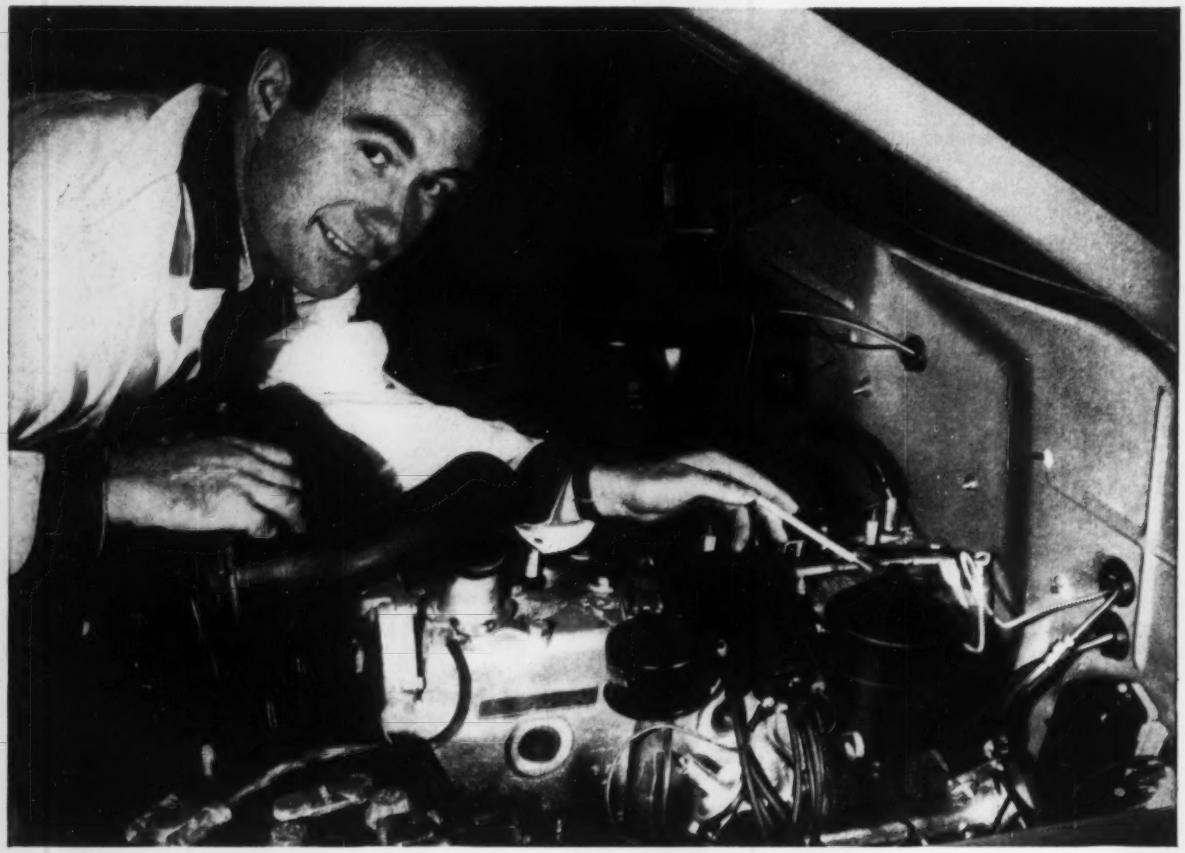


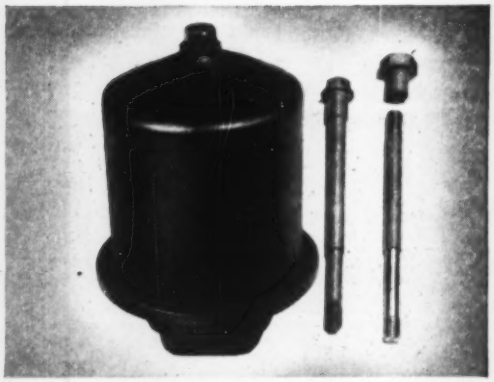
Here's where Purolator screened out rising costs

• Purolator makes oil filters for a prominent auto maker. They're top-notch filters that do a tough job well. Purolator and the car manufacturer are both proud of them.

Not long ago an RB&W "fastener engineer" got loose in the Purolator plant—just when company production executives were looking for a way to lick rising costs. He noticed that the Purolator filter was being assembled with a two-piece fastener made slowly and laboriously on a screw machine.

Our man told the Purolator people about RB&W's batteries of cold-forming machines. Purolator wanted to know more. Now their filter is assembled with a one-piece RB&W fastener that costs far less to make and assemble.

Chances are you can find a stage in your operations where RB&W "fastener engineering" can help you keep costs in line. As a leading manufacturer of all kinds of fasteners, we're always able to recommend and supply the right ones for all your needs. Write RUSSELL, BURDSALL & WARD BOLT AND NUT COMPANY, Port Chester, N. Y.

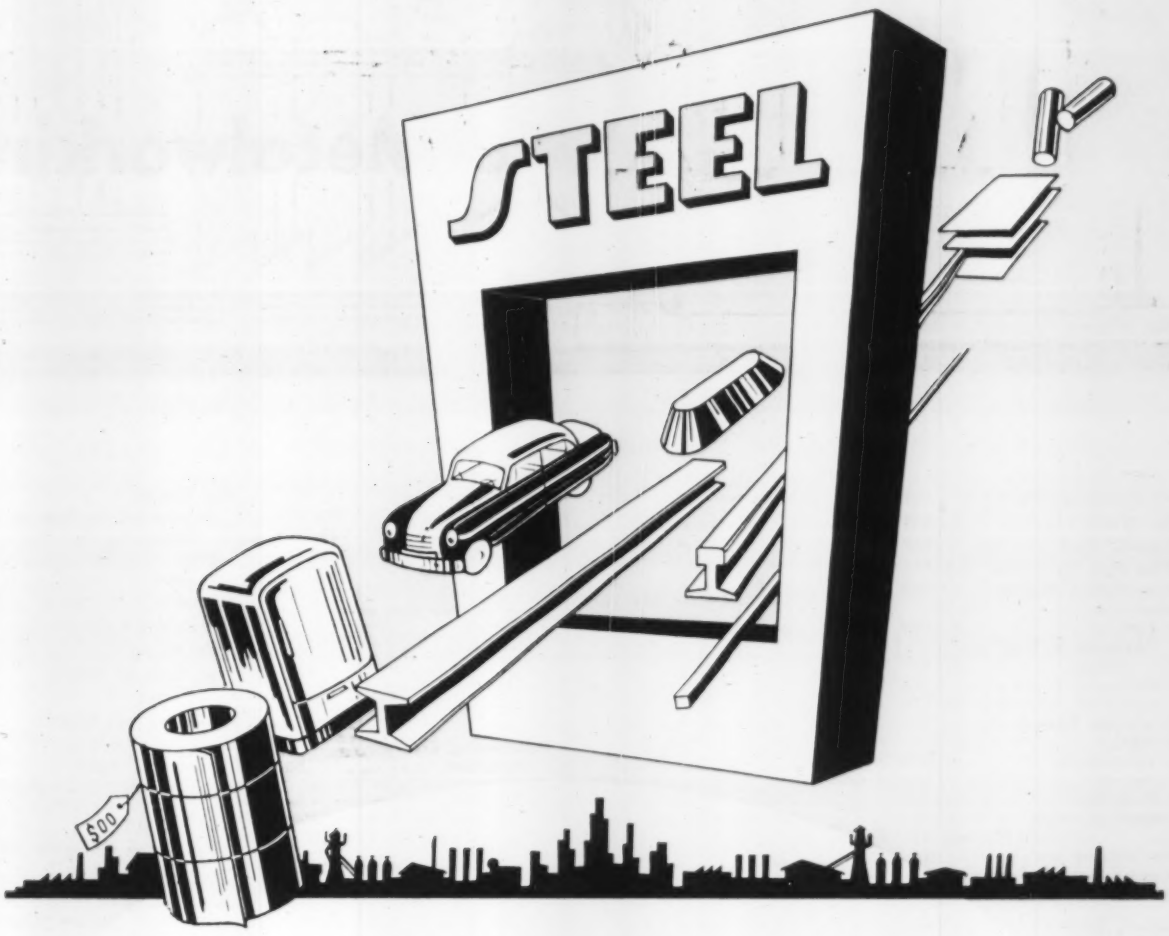


EASIER, FASTER ASSEMBLY undercut high costs when Purolator switched from a two-piece fastener *(right)* to an RB&W-designed cold-formed fastener *(left)* for its famous oil filter.

RB&W

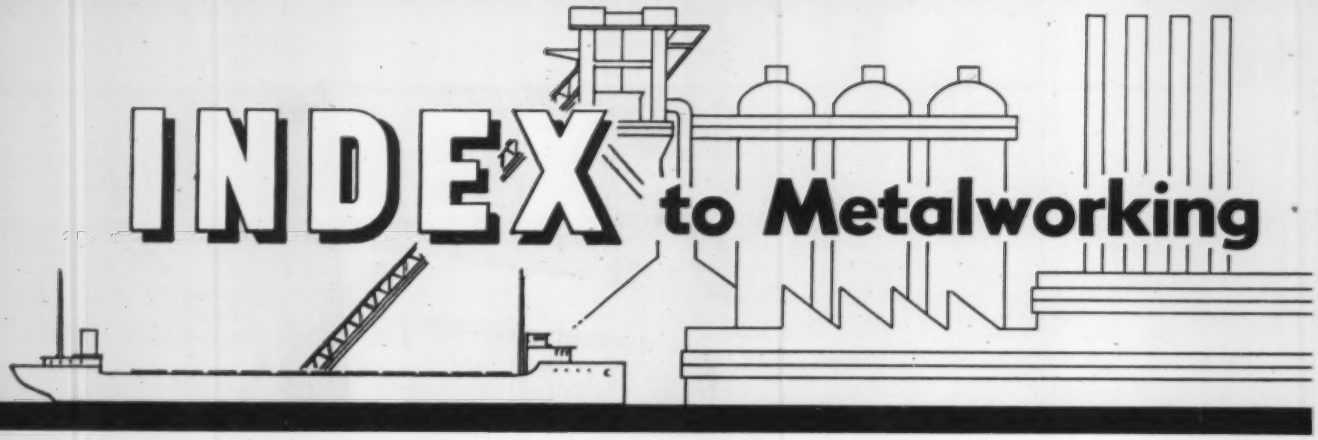
108 YEARS MAKING STRONG THE THINGS THAT MAKE AMERICA STRONG

Plants at: PORT CHESTER, N. Y., CORAOPOLIS, PA., ROCK FALLS, ILL., LOS ANGELES, CALIF. *Additional sales offices at:* PHILADELPHIA, PITTSBURGH, DETROIT, CHICAGO, DALLAS, SAN FRANCISCO. *Sales agents at:* PORTLAND, SEATTLE. *Distributors from coast to coast.*



1954 METALWORKING FACTS and FIGURES

• This is the sixth annual edition of Metalworking Facts and Figures. It not only continues and brings up to date the statistics published a year ago but it also is a further refinement of the preceding edition. One of the main aims of the Facts and Figures section is to give you the world's most complete selection of statistics on production of goods by the metalworking industry. But the job does not stop there. Covered too in these 48 pages are such related subjects as labor, prices, earnings and many others. When you need figures on metalworking, look inside for the answer.



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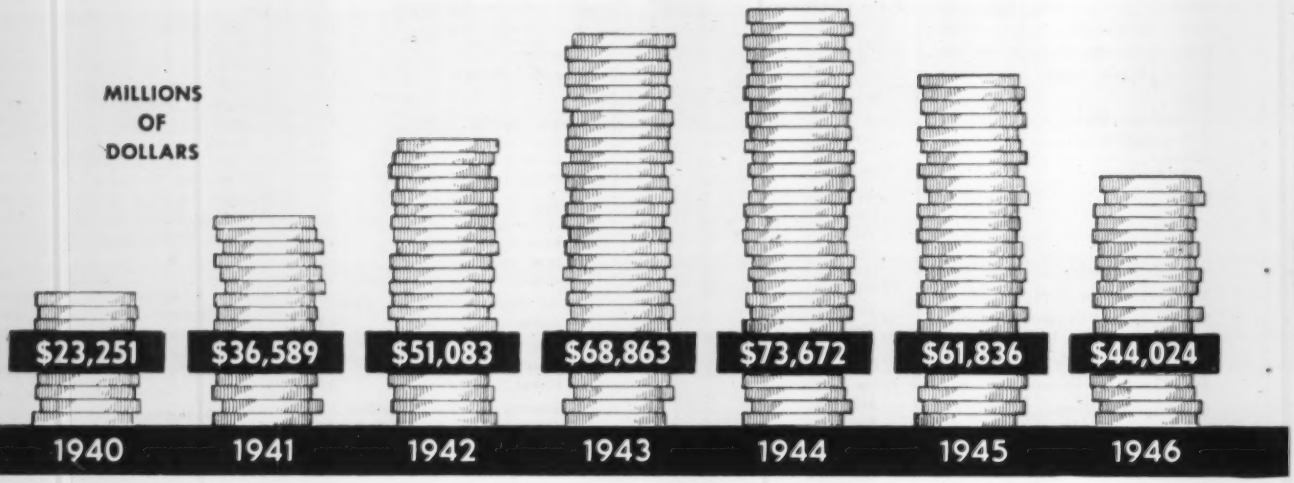
METALWORKING: America's

For the fourth consecutive year a new record for manufacturers' sales in the metalworking industry was set in 1953. Estimated sales for that year are $126,667,000,000. That figure does not include ordnance. Figures on ordnance production are not revealed by the government. Data presented here are revised compilations by the U. S. Department of Commerce, with 1953 estimated by STEEL on basis of actual sales for the first nine months and with consideration given to business trends in the final quarter.



MANUFACTURERS' SALES IN METALWORKING INDUSTRY†

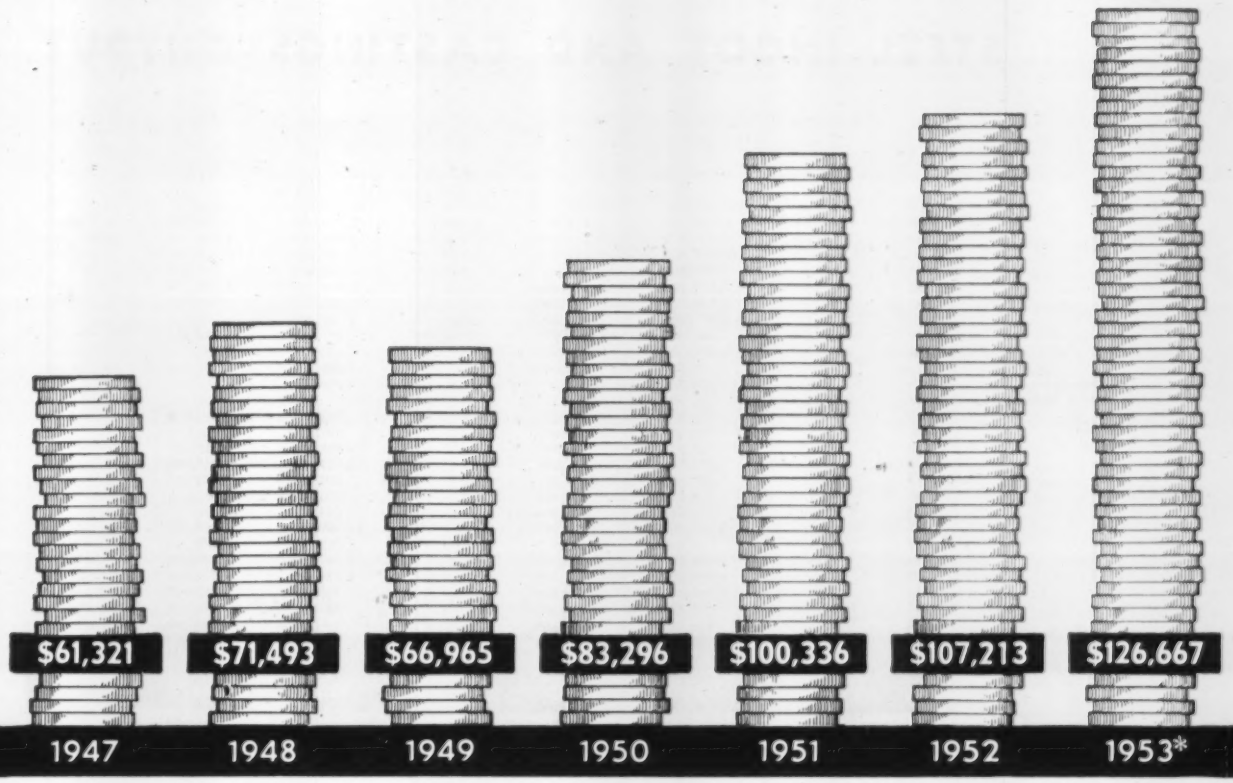
(Millions of Dollars)

New Standard Industrial Classifications	Primary Metals	Fabricated Metal Products	Machinery Except Electrical	Electrical Machinery and Equipment	Transportation Equipment	Instruments	TOTAL Metalworking Industry
1953*	25,380	17,702	25,307	17,022	37,150	4,106	126,667
1952‡	22,370	14,229	24,154	13,717	29,407	3,336	107,213
1951	21,105	14,120	21,396	12,170	25,465	3,080	100,336
1950	19,651	11,681	16,150	10,709	22,656	2,449	83,296
1949	14,744	9,159	14,079	8,288	18,717	1,978	66,965
1948	17,153	10,200	15,731	8,890	17,476	2,043	71,493

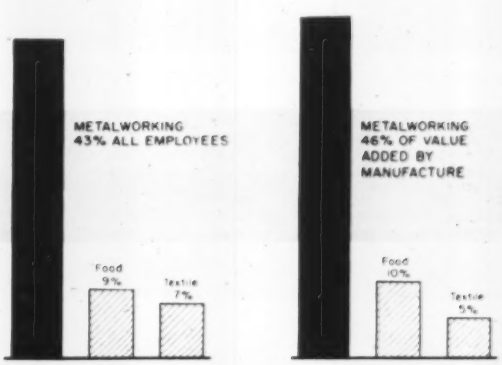
Former Industry Group Classifications	Iron-Steel and Products	Nonferrous Metal and Products	Electrical Mach. and Equipment	Machinery Except Electrical	Automobiles and Equipment	Trans. Equip. Except Automobiles	TOTAL Metalworking Industry
1948	22,188	5,946	9,024	15,658	13,662	3,818	70,296
1947	19,172	5,633	8,299	13,697	11,478	3,042	61,321
1946	14,202	4,705	5,658	9,824	6,624	3,011	44,024
1945	16,812	4,463	6,302	11,640	11,446	11,173	61,836
1944	17,795	4,755	7,104	12,907	15,096	16,015	73,672
1943	16,772	4,595	5,734	12,286	13,422	16,054	68,863
1942	14,563	3,411	4,550	10,370	7,956	10,233	51,083
1941	11,921	3,065	3,769	7,390	6,530	3,914	36,589
1940	7,678	2,120	2,483	4,697	4,697	1,576	23,251

† Figures for 1948 and later represent a shift to the Standard Industrial Classification system. Data for 1948 are presented on the old industry group classification as well as the new.
‡ Figures for 1952 are adjusted for seasonal variation, but figures for 1951, 1950, 1949 and 1948 are not.
* Estimate for 1953 is by STEEL. Figures for other years are from Office of Business Economics.

Greatest Industry



HOW METALWORKING TOWERS OVER OTHER MANUFACTURING INDUSTRIES



Standard Industrial Classifications	TOTAL NUMBER PLANTS*	NUMBER OF EMPLOYEES*	VALUE Added by Manufacture (Thousands)*
20. Food and Kindred Products	36,829	1,479,583	$11,340,145
21. Tobacco Manufactures	n.a.	93,175	867,590
22. Textile Mill Products	7,584	1,134,680	5,256,507
23. Apparel and Related Products	28,979	1,142,655	4,849,336
24. Lumber and Products	n.a.	742,705	3,449,260
25. Furniture and Fixtures	8,778	331,661	1,904,405
26. Paper and Allied Products	4,334	682,734	3,860,063
27. Printing and Publishing	30,147	772,801	5,660,124
28. Chemicals and Allied Products	11,007	698,071	8,266,761
29. Petroleum and Coal Products	1,024	220,227	2,618,927
30. Rubber Products	730	255,079	1,744,141
31. Leather and Leather Products	5,012	361,373	1,597,377
32. Stone, Clay and Glass Products	10,435	510,353	3,531,294
33. Primary Metal Industries	**5,500**	**1,239,570**	**9,045,495**
34. Fabricated Metal Products	**17,953**	**1,007,589**	**7,168,308**
35. Machinery (except Electrical)	**20,336**	**1,650,533**	**12,805,556**
36. Electrical Machinery	**4,421**	**956,337**	**6,868,847**
37. Transportation Equipment	**3,610**	**1,635,270**	**11,924,276**
38. Instruments	**2,835**	**273,936**	**1,958,071**
Total Metalworking Industry	**54,655**	**6,763,235**	**49,770,553**
39. Miscellaneous Manufactures	14,572	627,675	3,730,941

* Based on 1952 Annual Survey of Manufactures
n.a.—not available

World Production

METALWORKING FACTS AND FIGURES

By Countries—Net Tons

STEEL INGOT AND CASTINGS OUTPUT

	1953a	1952	1951	1950	1949	1948	1947	1946
World Total	256,385,000	231,304,149	231,189,538	207,303,445	177,463,076	168,764,990	147,200,111	120,881,060
	↓	↓	↓	↓	↓	↓	↓	↓
United States	112,300,000	93,168,039	105,199,848	96,836,075	77,978,176	88,640,470	84,894,071	66,602,724
Canada	4,200,000	3,731,840	3,568,770	3,383,520	3,190,430	3,198,720	2,945,936	2,334,640
Great Britain	19,600,000	18,388,050	17,515,120	18,247,825	17,419,250	16,661,800	14,250,880	14,218,736
France	11,000,000	11,953,700	10,818,500	9,517,200	10,672,200	7,959,600	6,317,766	4,858,000
Saar	3,000,000	3,105,300	2,863,300	2,087,800	1,932,700	1,350,800	780,216	(d)
Belgium	5,000,000	5,607,800	5,577,000	4,167,900	4,252,600	4,308,700	3,179,270	2,517,200
Luxemburg	3,000,000	3,302,200	3,384,700	2,696,100	2,499,200	2,698,300	1,887,726	1,426,096
Italy (b)	3,600,000	3,820,850	3,307,590	2,555,300	2,260,500	2,337,500	1,874,502	1,270,640
Spain	1,000,000	998,030	900,020	899,800	791,560	631,680	596,182	660,800
Sweden	1,820,000	1,857,900	1,677,500	1,604,900	1,530,100	1,382,700	1,312,482	1,324,624
Germany	.....	.....	.....	14,427,600	11,611,600	6,483,300	3,490,034	3,318,448
Germany, West Zone	16,900,000	17,386,600	14,856,600	.....	.....	.....	.....	.....
Germany, Soviet Zone	2,420,000	2,082,300	1,707,200	.....	.....	.....	.....	.....
Austria	1,350,000	1,162,260	1,130,580	1,037,300	918,060	712,800	394,516	206,080
The Netherlands	920,000	753,500	608,300	539,000	470,470	380,800	.....	.....
Czechoslovakia	4,500,000	3,934,900	3,643,200	3,312,100	3,038,200	2,915,000	2,519,172	1,842,624
Poland	3,960,000	3,501,300	3,071,200	2,766,500	2,533,300	2,150,000	1,740,058	1,344,000
Hungary	1,760,000	1,535,600	1,357,400	1,124,200	933,900	820,000	662,302	392,000
Rumania	825,000	767,800	710,600	613,800	504,900	373,000	.....	.....
Yugoslavia	550,000	489,500	473,000	470,800	438,900	400,000	.....	.....
Russia	41,800,000	37,950,000	34,540,000	30,030,000	25,600,000	18,150,000	14,300,000	13,440,000
Japan	8,380,000	7,703,380	7,151,980	5,322,900	3,549,700	1,900,000	1,070,042	700,000
India	1,650,000	1,765,120	1,679,680	1,610,335	1,515,360	1,344,000	1,389,732	1,457,120
Australia	2,250,000	1,839,040	1,649,870	1,395,185	1,341,650	1,424,640	1,511,328	1,124,144
South Africa	1,400,000	1,326,080	1,045,070	832,385	804,100	766,080	658,896	555,184
Brazil	1,050,000	990,080	927,300	867,460	676,610	531,300	426,900	378,015
Mexico	500,000	663,000	498,410	240,460	379,610	294,800	353,100	276,100
Other Countries (c)	1,650,000	1,530,000	1,326,820	717,000	620,000	950,000	645,000	633,885

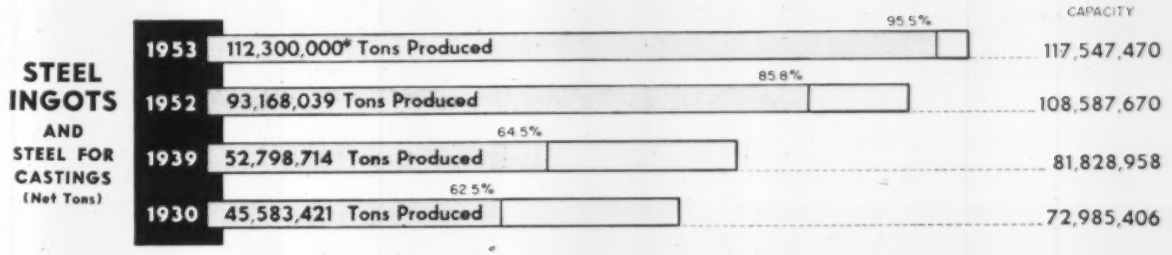
(a) Estimated.
(b) Without Trieste from 1951.
(c) Countries producing less than 500,000 tons a year.
(d) Included in Germany.
(e) Includes ferroalloys made in electric furnaces.

PIG IRON AND FERROALLOYS OUTPUT

	1953a	1952	1951	1950	1949	1948	1947	1946
World Total	183,245,000	165,155,715	163,378,353	145,829,801	127,437,775	124,250,549	107,664,844	84,910,946
	↓	↓	↓	↓	↓	↓	↓	↓
United States (e)	77,500,000	63,353,955	72,488,543	66,400,311	54,916,785	61,911,559	60,117,319	46,199,826
Canada	3,050,000	2,683,520	2,812,540	2,497,600	2,356,480	2,365,440	2,190,048	1,520,736
Great Britain	12,400,000	12,015,020	10,829,050	10,788,850	10,638,320	10,389,570	8,719,200	8,692,544
France	9,500,000	10,745,900	9,625,000	8,537,100	9,179,500	7,214,900	5,384,372	3,857,280
Saar	2,700,000	2,805,000	2,605,900	1,850,200	1,740,200	1,247,400	719,606	(d)
Belgium	4,600,000	5,252,500	5,335,000	4,064,500	4,123,900	4,337,300	3,107,640	2,392,656
Luxemburg	3,000,000	3,383,600	3,472,700	2,748,900	2,609,200	2,886,400	2,003,436	1,504,384
Italy (b)	1,500,000	1,300,200	1,110,450	482,790	448,800	578,600	425,372	192,864
Spain	900,000	844,800	719,400	733,700	676,000	581,500	554,306	540,960
Sweden	1,130,000	1,157,200	936,100	931,150	945,670	858,480	800,052	750,400
Germany	.....	.....	.....	10,791,000	8,404,000	5,350,000	2,640,392	2,707,824
Germany, West Zone	12,900,000	14,164,700	11,766,700	.....	.....	.....	.....	.....
Germany, Soviet Zone	990,000	723,800	375,100	.....	.....	.....	.....	.....
Austria	1,450,000	1,290,300	1,153,900	971,410	921,470	688,200	306,356	63,840
The Netherlands	690,000	592,900	576,400	499,620	477,400	486,200	.....	.....
Czechoslovakia	3,190,000	2,655,400	2,370,500	2,257,200	2,071,000	1,850,000	1,568,146	1,058,400
Poland	2,530,000	1,960,200	1,734,700	1,636,800	1,367,000	1,210,000	957,638	800,800
Hungary	880,000	632,500	556,600	550,000	473,000	445,000	339,416	175,840
Russia	30,800,000	27,720,000	24,310,000	21,340,000	18,500,000	15,400,000	12,500,000	10,060,000
Japan	4,900,000	3,831,620	3,550,000	2,528,680	1,740,480	914,100	409,940	203,840
India	2,000,000	2,064,160	2,016,110	1,880,370	1,804,320	1,639,700	1,553,269	1,584,912
Australia	2,030,000	1,718,080	1,470,900	1,229,870	1,170,400	1,383,900	1,280,384	978,656
South Africa	1,320,000	1,211,840	866,880	807,850	780,980	705,100	707,952	597,184
Brazil	900,000	892,640	848,760	801,900	562,870	607,200	426,827	378,015
Other Countries (c)	2,385,000	2,155,880	1,887,120	1,500,000	1,530,000	1,200,000	953,173	629,985

Production-Capacity

METALWORKING FACTS AND FIGURES



ANNUAL STEEL CAPACITY AND PRODUCTION BY PROCESSES

	Open-hearth		Bessemer		Crucible		Electric		TOTAL		Per Cent
	Capacity	Production	Capacity	Production	Capacity	Production	Capacity	Production	Capacity†	Production	Capacity
1953.....	102,677,980	.....	4,637,000	.....	40	‡	10,232,450	.....	117,547,470	112,300,000	95.5
1952.....	94,973,780	82,846,439	5,381,000	3,523,677	40	‡	8,232,850	6,797,923	108,587,670	93,168,039	85.8
1951.....	91,054,020	93,166,518	5,621,000	4,890,946	20	‡	7,554,610	7,142,384	104,229,650	105,199,848	100.9
1950.....	86,984,490	86,262,509	5,537,000	4,534,558	20	‡	6,871,290	6,039,008	99,392,800	96,836,075	96.9 #
1949.....	84,817,040	70,248,803	5,191,000	3,946,656	20	‡	6,112,870	3,782,717	96,120,930	77,978,176	81.1
1948.....	83,610,690	79,340,157	5,226,000	4,243,172	20	‡	5,396,750	5,057,141	94,233,460	88,640,470	94.1
1947.....	81,010,990	76,873,793	5,154,000	4,232,543	20	‡	5,076,240	3,787,735	91,241,250	84,894,071	93.0
1946.....	81,236,250	60,711,983	5,154,000	3,327,737	20	‡	5,500,290	2,563,024	91,890,560	66,602,724	72.5
1945.....	84,171,590	71,939,602	5,874,000	4,305,318	3,800	24	5,455,890	3,456,704	95,505,280	79,701,648	83.5
1944.....	82,223,610	80,363,953	6,074,000	5,039,923	3,800	25	5,350,880	4,237,699	93,652,290	89,641,600	95.5
1943.....	79,180,880	78,621,804	6,553,000	5,625,492	3,800	146	4,554,980	4,589,070	90,292,660	88,836,512	98.1
1942.....	78,107,260	76,501,957	6,721,400	5,553,424	3,800	2,010	3,737,510	3,974,540	88,569,970	86,031,931	96.8
1941.....	74,565,510	74,389,619	6,996,520	5,578,071	3,942	2,313	2,586,320	2,569,256	84,152,292	82,839,259	97.3
1940.....	73,721,592	61,573,083	6,009,920	3,708,573	5,354	1,024	1,852,630	1,700,006	81,619,496	66,982,686	82.1
1939.....	72,959,638	48,409,500	7,138,880	3,358,916	5,354	931	1,725,088	1,029,067	81,828,958	52,798,714	64.5
1938.....	71,472,370	29,080,016	7,212,800	2,106,340	9,610	7	1,490,858	565,627	80,185,638	31,751,990	39.6
1937.....	69,725,736	51,824,979	7,084,000	3,863,918	11,850	1,046	1,326,788	947,002	78,148,374	56,636,945	72.5
1936.....	68,946,829	48,760,463	8,058,400	3,873,472	11,850	914	1,147,221	865,150	78,164,300	53,499,999	68.4
1935.....	68,544,310	34,401,280	8,842,400	3,175,235	11,850	719	1,053,370	606,471	78,451,930	38,183,705	48.7
1934.....	68,222,445	26,354,838	8,842,400	2,421,840	15,704	595	1,044,867	404,651	78,128,416	29,181,934	37.4
1933.....	68,241,286	22,827,473	8,872,668	2,720,346	23,684	763	1,476,766	471,747	78,614,403	26,020,229	33.1

* Estimated by STEEL. ‡ Included with electric steel. † As of Jan. 1. # Based on average annual capacity of 99,982,650 tons. American Iron & Steel Institute.

MONTHLY OUTPUT OF STEEL FOR INGOTS AND CASTINGS

	Open-hearth		Bessemer		Electric		Total		Calculated	No.
	Net Tons	% Capac.	Net Tons	% Capac.	Net Tons	% Capac.	Net Tons	% Capac.	Net Tons Weekly	weeks in mo.
1953 ..	.....	....	.....	....	.....	....	.....	....	.....	...
Jan. ..	8,841,679	101.4	350,200	88.9	706,083	81.2	9,897,962	99.1	2,234,303	4.43
Feb. ..	7,939,299	100.8	329,389	92.6	664,091	84.6	8,932,779	99.1	2,233,195	4.00
Mar. ..	9,050,773	103.7	354,710	90.0	762,615	87.7	10,168,098	101.8	2,295,282	4.43
Apr. ..	8,493,909	100.5	334,605	87.7	717,024	85.2	9,545,538	98.7	2,225,067	4.29
May ..	8,925,163	102.3	354,577	90.0	717,340	82.5	9,997,080	100.1	2,256,677	4.43
June ..	8,394,502	99.4	332,060	87.0	677,917	80.5	9,404,479	97.2	2,192,186	4.29
July ..	8,316,342	95.5	324,068	82.4	635,263	73.2	9,275,673	93.1	2,098,569	4.42
Aug. ..	8,463,155	97.0	310,074	78.7	632,351	72.7	9,405,580	94.2	2,123,156	4.43
Sept. ..	8,076,277	95.8	287,638	75.6	519,513	61.9	8,883,428	92.1	2,075,567	4.28
Oct. ..	8,641,000	99.0	325,000	82.5	493,000	56.7	9,459,000	94.7	2,135,000	4.43
1952 ..	82,846,439	87.2	3,523,677	65.5	6,797,923	82.6	93,168,039	85.8	1,782,097	52.28
Jan. ..	8,103,123	100.7	407,298	89.3	626,797	89.8	9,137,218	99.3	2,062,577	4.43
Feb. ..	7,703,066	102.4	382,712	89.8	572,438	87.8	8,658,216	100.7	2,091,357	4.14
Mar. ..	8,401,140	104.4	378,861	83.1	625,289	89.6	9,405,290	102.2	2,123,090	4.43
Apr. ..	7,101,199	91.1	323,006	73.2	567,935	84.1	7,992,140	89.7	1,862,970	4.29
May ..	7,291,865	90.6	318,642	69.9	595,135	85.3	8,205,642	89.2	1,852,289	4.43
June ..	1,446,927	18.6	22,862	5.2	170,000	25.2	1,639,789	18.4	382,235	4.29
July ..	1,347,587	16.8	2,000	0.4	277,859	39.9	1,627,446	17.7	368,200	4.42
Aug. ..	7,599,888	94.4	309,361	67.8	590,476	84.6	8,499,725	92.4	1,918,674	4.43
Sept. ..	8,039,128	103.4	351,620	79.8	672,539	99.8	9,063,287	102.0	2,117,590	4.28
Oct. ..	8,747,640	108.7	347,042	76.1	713,402	102.3	9,808,084	106.6	2,214,014	4.43
Nov. ..	8,396,227	107.7	336,902	76.3	706,999	104.7	9,440,128	105.9	2,200,496	4.29
Dec. ..	8,668,649	108.0	343,371	75.5	679,054	97.6	9,691,074	105.6	2,192,551	4.42

American Iron & Steel Institute

PIG IRON†

CAPACITY and PRODUCTION

Net Tons

	Capacity	Production	%
1953	79,380,240	76,300,000*	96.1*
January		6,564,383	97.3
February		5,881,518	96.6
March		6,677,361	99.0
April		6,230,641	95.4
May		6,587,115	97.7
June		6,372,531	97.6
July		6,516,487	96.8
August		6,471,554	96.0
September		6,202,619	95.2
October		6,497,710	96.3
November		.....	...
December		.....	...
1952	73,782,340	62,150,926	84.2
1951	72,471,780	71,227,750	98.3
1950	71,560,110	65,439,769	91.4
1949	70,541,850	54,175,534	76.8
1948	67,438,930	61,063,806	90.5
1947	65,709,260	59,314,348	90.3
1946	67,340,590	45,547,997	67.6
1945	67,313,860	54,166,482	80.5
1944	67,921,410	62,072,683	91.4
1943	64,188,220	61,920,314	96.5
1942	60,606,850	60,115,387	99.2
1941	57,774,640	56,070,566	97.1
1940	55,723,640	46,979,691	84.3
1939	56,325,830	35,396,478	62.8
1938	56,782,208	21,182,569	37.3

* Estimated by STEEL. † Including ferroalloys made in blast furnaces.
American Iron & Steel Institute

ALLOY STEEL PRODUCTION

Total Ingots and Castings—Net Tons

ALLOY STEEL PRODUCTION BY PROCESSES

Ingots and Castings—Net Tons

	Open-hearth					
	Basic	Acid	Total	Bessemer	Crucible	Electric
1953‡	.....	.....	5,982,505	....	†	3,124,974
1952	5,807,191	218,867	6,026,058	....	†	3,108,693
1951	6,585,635	238,034	6,823,669	....	†	3,300,918
1950	5,738,067	123,253	5,861,320	....	†	2,708,785
1949	4,192,344	105,550	4,297,894	....	†	1,599,675
1948	6,285,054	128,915	6,413,969	....	†	2,067,145
1947	5,520,540	128,754	5,649,294	....	†	1,778,937
1946	4,325,657	115,711	4,441,368	....	†	1,635,827
1945	5,572,353	274,889	5,847,242	....	18	2,800,451
1944	6,494,627	515,662	7,010,289	....	23	3,622,774
1943	8,539,523	677,416	9,216,939	....	136	3,932,743
1942	7,524,209	608,867	8,133,076	....	522	3,392,776
1941	5,306,415	433,240	5,739,655	3,890	933	2,461,651
1940	3,421,961	252,965	3,674,926	3,990	255	1,286,716
1939	2,302,273	156,581	2,458,854	3,486	231	749,384
1938	1,179,031	102,089	1,281,120	13	5	372,372
1937	2,559,200	164,455	2,723,655	....	270	672,616
1936	2,508,671	129,658	2,638,329	....	234	591,094

‡ First ten months.
† Included with electric steel.
American Iron & Steel Institute.

* Estimated

Stainless Steel Production

Net Tons of Ingots

Type Number	9 mos., 1953	12 mos., 1952	Type Number	9 mos., 1953	12 mos., 1952
301	8,842	10,294	414	687	1,719
302	63,667	73,379	416	24,327	35,883
302B	420	282	420	3,930	4,615
303	25,861	32,659	430	368,355	289,111
304	89,008	136,527	430F	2,859	2,685
308	3,119	13,597	431	2,262	4,962
309	4,885	7,168	440A	1,886	1,430
310	10,095	21,616	440B	1,524	1,696
316	35,158	45,569	440C	2,720	3,243
321	36,317	70,204	442	1,766	2,083
347	6,968	13,265	443	323	296
403	20,477	23,035	446	2,679	3,740
405	3,029	3,328	All Other	78,893	85,399
406	1,140	1,896			
410	35,226	38,783	Total	836,463	930,164

American Iron & Steel Institute

High Speed and Tool Steel Bars

(Excluding Hollow Drill Steel)

Shipments—Net Tons

CLASS A HIGH SPEED STEEL

Grade	C (Min.)	Cr	W (Maximum)	Mo	V	Co (Min.)	10 mos. 1953	12 mos. 1952
I	0.60	4.5	6.75	5.5	2.1 Max.	...	9,993	11,821
I-b	0.90	4.5	6.75	6.5	2.25 Min.	...	499	549
I-c	0.60	4.5	6.75	5.5	2.2 Max.	3.5	76	243
II	0.60	4.5	2.0	9.25	1.3 Max.	...	4,493	4,185
II-c	0.60	4.5	2.0	9.25	2.2 Max.	3.5	151	214
III	0.60	4.5	...	9.25	2.2 Max.	...	3,155	2,811
III-c	0.60	4.5	...	9.25	2.2 Max.	3.5	43	25
Total							18,410	19,848

CLASS B HIGH SPEED STEEL

IV	0.55	4.5	19.0	...	1.3 Max.	...	1,940	1,601
IV-b	0.55	4.5	19.0	1.25	1.75 Min.	...	215	204
IV-c	0.55	4.5	22.0	1.25	2.2 Max.	3.5	713	812
Total							2,868	2,617

OTHER TOOL STEELS

V	All hot-work steel	12,111	12,719
VI	High chromium (4% Cr minimum) die steels	7,348	9,709
VII	All other alloy tool steels	45,605	57,103
VIII	Carbon tool steels, excluding hollow drill steel	14,761	19,980
Total		79,825	99,502
Grand Total		101,103	121,967

American Iron & Steel Institute

Steel Forgings

Shipments for Sale—Net Tons

1953	Drop and Upset	Press and Open Hammer	Total
Jan.	137,221	46,324	183,545
Feb.	135,682	48,027	183,709
Mar.	147,701	52,451	200,152
Apr.	140,510	55,931	196,441
May	134,686	56,503	191,189
June	132,580	52,743	185,323
July	112,848	42,440	155,288
Aug.	110,926	39,586	150,512
Sept.	.....	.....	.....
Oct.	.....	.....	.....
Nov.	.....	.....	.....
Dec.	.....	.....	.....
1952	1,366,123	519,539	1,885,662
Jan.	130,154	46,146	176,300
Feb.	125,663	47,550	173,213
Mar.	128,913	51,169	180,082
Apr.	127,986	44,809	172,795
May	116,375	44,171	160,546
June	102,766	35,314	138,080
July	69,777	29,618	99,395
Aug.	79,535	41,431	120,966
Sept.	107,966	41,676	149,642
Oct.	130,515	47,960	178,475
Nov.	112,622	43,008	155,630
Dec.	133,851	46,687	180,538
1951	1,323,713	503,093	1,826,806
1950	1,089,515	270,638	1,360,153
1949	866,444	272,184	1,138,628
1948	1,028,712	385,977	1,414,689

U. S. Bureau of the Census

FINISHED STEEL DISTRIBUTION

By Market Classifications

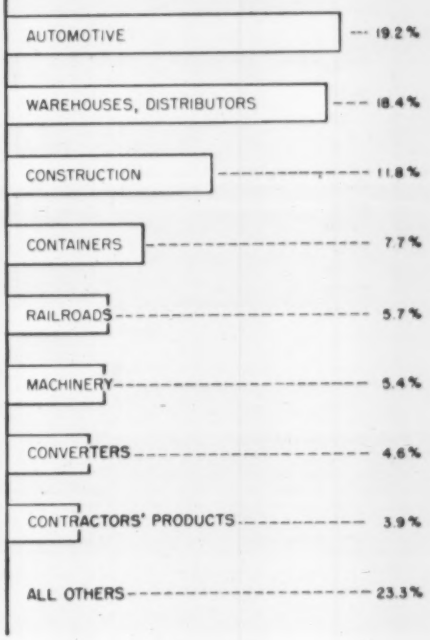
(All Grades, Net Tons)

	12 mos. 1953*	12 mos. 1952	12 mos. 1951	12 mos. 1950
Automotive	15,644,563	10,850,797	12,982,356	14,472,707
Warehouses and Distributors	14,992,707	13,328,642	14,399,432	13,359,724
Construction, including Maintenance	9,614,888	7,800,619	9,583,500	8,602,083
Containers	6,274,122	5,550,625	6,523,954	5,911,164
Rail Transportation	4,644,480	3,986,029	5,781,589	4,299,346
Machinery, Indus. Equip. & Tools	4,400,033	3,795,596	4,245,167	3,473,896
Converters and Processors	3,748,177	3,037,146	4,186,151	3,899,786
Contractors' Products	3,177,802	2,612,071	3,080,273	3,075,195
Ordnance, Other Military	2,770,391	2,095,593	1,200,211	194,614
Export	2,607,427	3,271,200	2,764,411	2,566,473
Electrical Machinery and Equip.	2,118,535	1,609,461	2,021,123	1,836,632
Appliances	2,037,104	1,359,227	1,836,807	2,087,853
Other Domestic & Commercial Equip.	2,037,000	1,562,458	2,030,669	1,804,449
Forgings (other than Automotive)	1,548,180	1,434,157	1,550,151	1,082,309
Bolts, Nuts, Rivets, Screws	1,466,678	1,297,486	1,598,735	1,410,011
Agricultural	1,303,714	1,347,042	1,638,456	1,537,708
Unclassified	896,603	822,736	1,261,575	1,329,648
Shipbuilding, Marine Equipment	896,003	1,028,554	884,210	327,413
Oil & Gas Drilling	814,821	768,208	834,632	620,413
Mining, Quarrying, Lumbering	325,928	309,628	374,769	289,302
Aircraft	162,964	136,337	150,779	51,566
Total	81,482,100	68,003,612	78,928,950	72,232,292

American Iron & Steel Institute

* Estimated by STEEL on basis of actual shipments in first 9 months.

WHERE THE STEEL GOES
1953— ESTIMATED



DISTRIBUTION
NET TONS

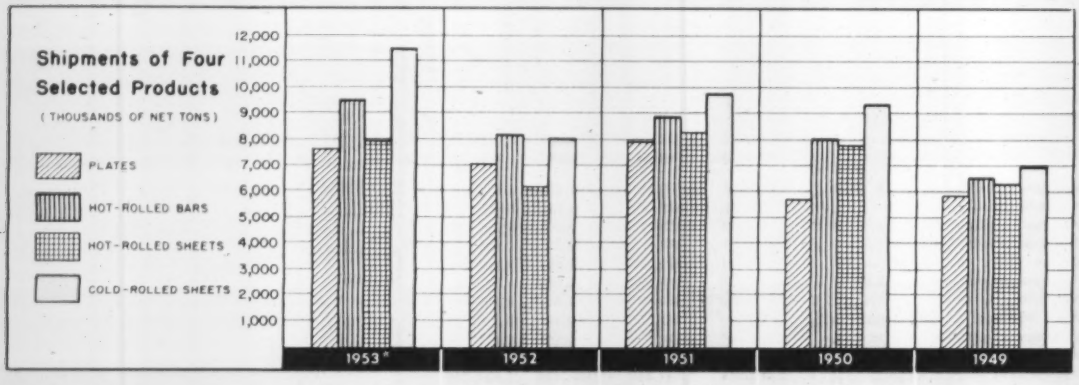
By Market Classifications	STAINLESS STEEL 6 mos. 1953	STAINLESS STEEL 12 mos. 1952	STAINLESS STEEL 12 mos. 1951	ALLOY STEEL (Other than Stainless) 6 mos. 1953	ALLOY STEEL 12 mos. 1952	ALLOY STEEL 12 mos. 1951	CARBON STEEL 6 mos. 1953	CARBON STEEL 12 mos. 1952	CARBON STEEL 12 mos. 1951
Converters and Processors	16,759	35,551	45,012	57,861	100,689	87,141	2,041,213	2,900,906	4,053,998
Forgings (Other than Automotive)	8,306	16,707	15,240	336,994	650,569	706,476	475,787	766,881	828,435
Bolts, Nuts, Rivets, Screws	4,890	6,546	6,594	47,861	88,622	105,111	713,538	1,202,318	1,487,030
Jobbers, Dealers, Distributors	88,908	128,202	126,384	253,131	441,688	415,632	7,447,924	12,758,752	13,857,416
Construction, including Maintenance	2,877	7,249	10,944	50,775	108,561	100,515	4,727,104	7,684,809	9,472,041
Contractors' Products	6,543	9,358	13,392	18,209	33,323	31,905	1,557,269	2,569,390	3,034,976
Automotive	69,270	62,317	85,346	1,188,235	1,521,236	1,873,538	6,868,822	9,267,244	11,023,472
Rail Transportation	3,442	1,928	4,307	99,692	151,656	220,827	2,321,961	3,832,445	5,556,455
Shipbuilding, Marine Equip.	1,792	3,466	1,640	32,005	45,146	28,782	456,025	979,942	853,788
Aircraft	19,120	36,157	33,583	40,616	62,860	61,171	25,896	37,320	56,025
Oil and Gas Drilling	1,806	2,142	1,460	95,379	170,256	157,271	322,363	595,810	675,901
Mining, Quarrying, Lumbering	349	575	680	12,823	25,245	27,118	158,030	283,808	346,971
Agricultural	164	203	339	24,870	38,462	49,474	682,221	1,308,377	1,588,643
Machinery, Indus. Equip. & Tools	22,092	42,099	47,546	332,273	554,547	680,145	1,937,572	3,198,950	3,517,476
Electrical Machinery and Equip.	9,211	17,071	17,742	308,307	437,661	531,791	769,757	1,154,729	1,471,590
Appliances, Utensils, Cutlery	21,557	28,941	46,156	18,879	22,482	35,782	1,053,930	1,307,804	1,754,869
Other Domestic & Commercial Equip.	6,823	10,226	14,771	16,467	24,216	26,421	1,031,158	1,528,016	1,989,477
Containers	826	711	2,406	13,031	25,313	20,488	3,230,268	5,524,601	6,501,060
Ordnance, Other Military	6,234	14,727	8,790	182,432	331,648	252,282	1,204,438	1,749,218	939,139
Unclassified	38,925	70,209	47,124	105,104	165,250	208,023	334,902	587,277	1,006,428
Export	6,420	15,318	10,054	67,918	151,951	106,050	1,357,567	3,103,931	2,648,307
Total	336,314	509,703	539,510	3,302,802	5,151,381	5,725,943	38,717,745	62,342,528	72,663,497

American Iron & Steel Institute

Steel Shipments

METALWORKING FACTS AND FIGURES

SHIPMENTS OF STEEL PRODUCTS



Steel Products—Net tons	Shipments	%	Shipments	%	Shipments	%	Shipments	%	Shipments	%
Ingots	814,821	1.0	1,128,070	1.7	1,315,846	1.7	888,324	1.2	2,261,285	3.9
Blooms, slabs, billets, tube rounds, sheet bars, etc.	2,607,427	3.2	2,301,042	3.4	2,239,747	2.8	2,233,832	3.1		
Skelp	81,482	0.1	107,134	0.2	152,474	0.2	123,388	0.2	118,533	0.2
Wire rods	896,303	1.1	741,541	1.1	847,369	1.1	816,555	1.1	570,397	1.0
Structural shapes (heavy)	4,970,408	6.1	4,138,251	6.1	4,921,970	6.2	4,197,653	5.8	3,669,503	6.3
Steel piling	325,928	0.4	234,461	0.3	399,073	0.5	342,277	0.5	301,824	0.5
Plates	7,577,835	9.3	7,006,123	10.3	7,910,594	10.0	5,677,094	7.9	5,759,065	9.9
Rails—Standard (over 60 lb)	1,874,088	2.3	1,348,324	2.0	1,699,042	2.2	1,705,243	2.4	1,772,734	3.0
Rails—All other	81,482	0.1	105,704	0.1	120,715	0.2	116,389	0.2	117,154	0.2
Joint bars	162,964	0.2	109,288	0.1	132,173	0.2	113,676	0.2	118,559	0.2
Tie plates	407,411	0.5	377,817	0.6	445,932	0.6	416,258	0.6	373,337	0.6
Track spikes	162,964	0.2	97,634	0.1	158,406	0.2	138,732	0.2	95,345	0.2
Wheels (rolled or forged)	325,928	0.4	329,825	0.5	396,561	0.5	268,662	0.4	285,733	0.5
Axles	162,964	0.2	164,230	0.2	221,097	0.3	130,601	0.2	159,628	0.3
Bars—Hot-rolled (including light shapes)	9,451,924	11.6	8,111,683	11.9	8,930,633	11.3	8,017,465	11.1	6,416,102	11.0
Bars—Reinforcing	1,955,570	2.4	1,813,146	2.7	1,900,125	2.4	1,674,079	2.3	1,572,588	2.7
Bars—Cold-finished	2,281,499	2.8	1,922,205	2.8	1,935,823	2.5	1,624,845	2.2	1,213,052	2.1
Tool steel	81,482	0.1	120,687	0.2	171,056	0.2	89,863	0.1	57,395	0.1
Standard pipe	2,851,874	3.5	2,425,351	3.6	2,933,321	3.7	2,599,818	3.6	2,090,445	3.6
Oil country goods	1,955,571	2.4	1,610,132	2.4	1,879,216	2.4	1,692,821	2.3	1,365,982	2.3
Line pipe	3,666,695	4.5	2,882,061	4.2	3,186,838	4.0	3,668,511	5.1	2,534,423	4.4
Mechanical tubing	1,140,749	1.4	945,314	1.4	980,066	1.2	743,892	1.0	944,370	1.7
Pressure tubing	488,893	0.6	417,550	0.6	332,430	0.4	248,798	0.3		
Wire—Drawn	3,014,838	3.7	2,638,562	3.9	3,219,829	4.1	2,867,476	4.0	2,138,878	3.7
Wire—Nails and staples	570,375	0.7	651,447	1.0	864,833	1.1	874,470	1.2	731,356	1.3
Wire—Barbed and twisted	162,964	0.2	240,733	0.3	237,805	0.3	237,604	0.3	215,047	0.4
Wire—Woven wire fence	244,446	0.3	331,405	0.5	416,704	0.5	483,920	0.7	358,162	0.6
Wire—Bale ties	81,482	0.1	57,766	0.1	110,407	0.1	83,831	0.1	42,828	0.1
Black plate	814,821	1.0	879,931	1.3	1,076,296	1.4	562,077	0.8	452,041	0.8
Tin and terne plate—Hot dipped	1,385,196	1.7	1,365,590	2.0	1,628,562	2.1	1,911,568	2.7	1,699,355	2.9
Tin plate—Electrolytic	3,259,284	4.0	2,817,449	4.1	2,887,129	3.7	2,840,599	3.9	1,993,468	3.4
Sheets—Hot-rolled	7,903,764	9.7	6,098,899	9.0	8,170,733	10.3	7,804,948	10.8	6,192,610	10.7
Sheets—Cold-rolled	11,407,494	14.0	8,009,255	11.8	9,640,960	12.2	9,338,312	12.9	6,886,946	11.8
Sheets—Galvanized	2,362,981	2.9	1,961,158	2.9	1,984,961	2.5	2,262,041	3.1	1,755,067	3.0
Sheets—All other coated	244,446	0.3	206,332	0.3	257,195	0.3	237,941	0.3	151,118	0.3
Sheets—Enameling	244,446	0.3	149,108	0.2	182,187	0.2	256,766	0.4	162,815	0.3
Electrical sheets and strip	814,821	1.0	607,076	0.9	757,861	1.0	716,592	1.0	379,180†	0.6
Strip—Hot-rolled	2,362,981	2.9	1,837,086	2.7	2,206,978	2.8	2,330,783	3.2	1,674,818	2.9
Strip—Cold-rolled	2,281,499	2.8	1,714,242	2.5	2,076,003	2.6	1,894,588	2.6	1,465,297	2.5
All other	.....	..	.....	..	.....	...	.....	...	7,570	0.0
Total steel products	81,482,100	100.0	68,003,612	100.0	78,928,950	100.0	72,232,292	100.0	58,104,010	100.0

1953 SHIPMENTS OF FINISHED STEEL BY TYPES

(Net tons)

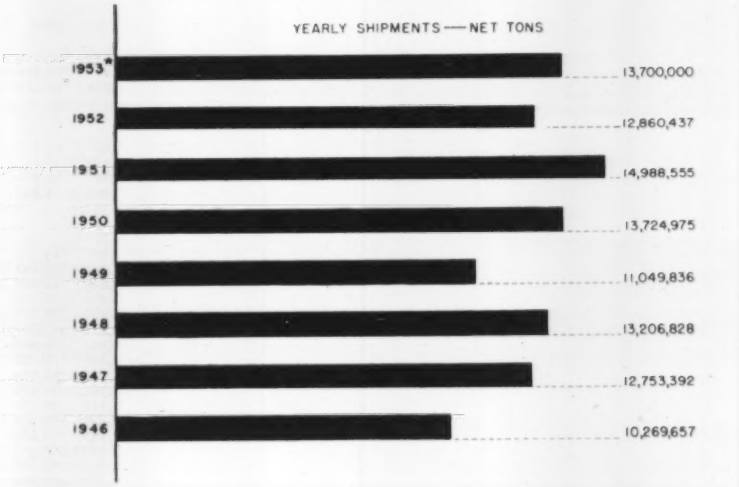
	Carbon	Alloy	Stainless	Total		Carbon	Alloy	Stainless	Total
Jan.	6,478,115	532,538	57,003	7,067,656	July	6,045,997	490,704	45,812	6,582,513
Feb.	5,984,887	494,734	53,606	6,533,227	Aug.	5,945,464	502,110	51,031	6,498,605
Mar.	6,790,010	588,015	58,894	7,436,919	Sept.	5,908,839	444,671	47,247	6,400,757
Apr.	6,541,478	564,129	56,853	7,162,460					
May	6,582,979	570,249	56,168	7,209,396	9 Mos.	56,620,620	4,740,287	480,685	61,841,592
June	6,342,851	553,137	54,071	6,950,059					

American Iron & Steel Institute

† Electrical sheets only

* Estimated

GRAY IRON CASTINGS



Shipments—Net Tons

	Miscellaneous	Ingot Molds	Chilled Iron Railroad Car Wheels	Cast Iron Pressure Pipe & Fittings	Cast Iron Soil Pipe & Fittings	For Sale	For Own Use
1953							
Jan.	730,216	252,181	38,385	93,930	47,233	622,392	539,553
Feb.	721,847	228,360	44,420	93,152	48,089	607,160	528,708
Mar.	800,390	250,447	41,414	114,885	57,135	674,720	589,551
Apr.	799,872	246,873	44,877	120,105	65,561	683,047	594,241
May	734,326	238,202	41,373	113,136	58,508	641,561	543,964
June	743,737	232,596	45,542	114,118	60,113	648,400	547,706
July	652,371	212,187	36,715	87,739	57,410	573,280	483,142
Aug.	646,902	217,930	40,327	107,805	56,428	588,543	480,849
Sept.	666,296	232,055	37,055	108,270	58,977	611,906	490,748
Oct.	.....	.....	.....	.....	.....	.....	.....
Nov.	.....	.....	.....	.....	.....	.....	.....
Dec.	.....	.....	.....	.....	.....	.....	.....
1952	8,113,242	2,238,309	544,896	1,312,518	651,472	7,371,700	5,488,737
Jan.	745,548	225,704	57,155	125,729	45,149	698,102	501,183
Feb.	733,067	219,251	50,444	107,649	44,712	657,628	497,515
Mar.	723,225	238,799	53,919	115,843	50,231	665,092	506,925
Apr.	773,538	204,805	48,506	117,929	60,023	658,818	545,983
May	698,332	186,998	44,229	117,586	53,485	624,430	476,200
June	616,895	19,467	44,066	103,335	51,500	502,322	332,941
July	427,757	14,794	40,783	96,784	56,305	431,889	204,534
Aug.	596,369	198,856	35,606	108,313	62,485	602,025	399,604
Sept.	676,732	230,219	39,912	107,847	64,663	629,708	489,665
Oct.	759,131	243,462	45,664	117,089	68,134	688,837	544,643
Nov.	649,316	218,349	41,655	99,196	52,219	593,779	466,956
Dec.	713,332	247,605	42,957	95,198	42,566	619,070	522,588
1951	9,573,347	2,614,517	639,996	1,473,192	687,503	8,453,048	6,535,507
Jan.	875,437	228,824	56,046	131,779	72,225	762,407	601,904
Feb.	811,724	193,648	49,423	117,141	62,290	684,928	549,298
Mar.	921,980	231,853	68,282	143,702	74,592	818,426	621,983
Apr.	880,565	217,970	61,993	134,302	68,395	766,919	596,306
May	898,328	225,129	65,721	139,854	67,619	796,468	600,183
June	847,024	216,620	58,620	121,851	64,872	742,794	566,193
July	653,656	200,764	40,792	88,217	45,383	568,126	460,686
Aug.	779,838	222,721	50,127	115,284	50,862	697,952	520,880
Sept.	704,657	204,856	45,467	111,893	47,916	625,511	489,278
Oct.	815,815	244,556	53,172	130,636	57,502	732,764	568,917
Nov.	737,971	222,665	48,759	129,766	44,672	674,139	509,694
Dec.	646,352	204,911	41,594	108,767	31,175	582,614	450,185
1952	8,113,242	2,238,309	544,896	1,312,518	651,472	7,371,700	5,488,737
1951	9,573,347	2,614,517	639,996	1,473,192	687,503	8,453,048	6,535,507
1950	8,745,298	2,423,376	546,301	1,215,367	794,633	7,323,739	6,401,236
1949	7,004,674	1,844,485	581,690	1,037,189	581,798	5,787,146	5,262,690
1948	8,625,527	2,029,874	742,339	1,155,095	653,993	7,380,603	5,826,225
1947	8,473,358	1,897,664	764,755	1,034,112	583,503	7,313,955	5,439,437
1946	6,952,462	1,397,776	723,891	786,314	409,214	6,104,862	4,164,795

U. S. Bureau of the Census

DIE CASTINGS

Shipments—Thousands of Pounds

Copper and Copper-Base

	1953	1952	1951
Jan.	844	804	1,240
Feb.	843	698	1,265
Mar.	901	624	1,394
Apr.	893	719	1,097
May	895	586	1,164
June	872	672	1,347
July	691	515	1,044
Aug.	854	595	1,268
Sept.	841	672	1,079
Oct.	....	805	915
Nov.	....	765	719
Dec.	....	804	600
Total	....	8,259	13,132

YEARLY TOTALS

1952	8,259	1949	9,499
1951	13,132	1948	13,642
1950	15,099	1947	13,138

Aluminum and Aluminum-Base

	1953	1952	1951
Jan.	20,052	12,758	14,882
Feb.	20,272	11,986	15,114
Mar.	22,255	12,040	15,087
Apr.	22,620	13,390	14,499
May	21,208	12,717	14,026
June	21,675	12,657	13,085
July	18,915	11,302	10,459
Aug.	18,200	11,730	11,767
Sept.	18,245	15,888	12,293
Oct.	....	18,284	13,049
Nov.	....	17,372	12,604
Dec.	....	19,608	10,891
Total	....	169,732	157,756

YEARLY TOTALS

1952	169,732	1949	98,340
1951	157,756	1948	128,903
1950	167,201	1947	115,644

Zinc and Zinc-Base

	1953	1952	1951
Jan.	45,658	36,027	44,632
Feb.	46,335	32,416	42,337
Mar.	54,111	33,085	48,060
Apr.	50,932	34,806	47,510
May	43,996	33,172	48,215
June	48,639	31,303	45,348
July	38,934	21,805	37,434
Aug.	37,788	27,419	40,831
Sept.	38,408	34,813	31,386
Oct.	....	42,523	36,483
Nov.	....	36,360	30,425
Dec.	....	41,809	29,704
Total	....	465,538	482,365

YEARLY TOTALS

1952	465,538	1949	397,001
1951	482,365	1948	457,088
1950	531,863	1947	438,693

Lead and Lead-Base

	1953	1952	1951
Jan.	1,935	2,283	2,050
Feb.	1,643	1,619	2,230
Mar.	1,919	1,631	3,133
Apr.	1,986	1,840	5,135
May	1,800	1,556	3,788
June	1,784	1,725	2,844
July	1,502	1,311	2,433
Aug.	1,809	1,491	2,777
Sept.	1,736	1,772	3,036
Oct.	....	2,131	2,846
Nov.	....	1,923	2,186
Dec.	....	1,648	2,409
Total	....	20,941	34,876

YEARLY TOTALS

1952	20,941	1949	13,743
1951	34,876	1948	22,887
1950	20,977	1947	18,165

U. S. Bureau of the Census

STEEL CASTINGS

Shipments—Net Tons

	Carbon	Alloy, Including Stainless	For Sale	For Own Use	Total
1953					
9 Mos.	1,020,622	429,970	1,115,207	335,385	1,450,592
Jan.	118,423	48,788	126,819	40,392	167,211
Feb.	122,624	53,051	137,592	38,083	175,675
Mar.	129,055	53,126	141,873	40,308	182,181
Apr.	128,457	51,158	140,051	39,564	179,615
May	117,318	48,331	126,380	39,269	165,649
June	116,358	48,307	125,984	38,681	164,665
July	95,891	43,686	105,687	33,890	139,577
Aug.	97,076	44,264	107,941	33,399	141,340
Sept.	95,420	39,259	102,880	31,799	134,679
Oct.	.....	.....	.....	.....	.....
Nov.	.....	.....	.....	.....	.....
Dec.	.....	.....	.....	.....	.....
1952	1,372,494	552,709	1,476,242	448,961	1,925,203
Jan.	133,985	49,753	139,488	44,250	183,738
Feb.	125,484	49,142	133,602	41,024	174,626
Mar.	125,787	47,907	131,997	41,697	173,694
Apr.	126,628	48,447	134,325	40,750	175,075
May	125,309	48,326	132,129	41,506	173,635
June	101,850	39,778	114,410	27,218	141,628
July	81,576	37,460	97,633	21,403	119,036
Aug.	107,203	43,029	113,997	36,235	150,232
Sept.	109,011	49,381	121,402	36,990	158,392
Oct.	116,201	48,954	124,626	40,529	165,155
Nov.	105,314	42,945	110,467	37,792	148,259
Dec.	114,146	47,587	122,166	39,567	161,733
1951	1,541,480	508,574	1,506,903	543,151	2,050,054
Jan.	128,504	38,013	124,002	42,515	166,517
Feb.	120,949	36,090	117,156	39,883	157,039
Mar.	142,132	40,633	134,184	48,581	182,765
Apr.	134,706	41,101	129,059	46,748	175,807
May	135,645	44,543	130,826	49,362	180,188
June	136,399	41,464	131,219	46,644	177,863
July	106,684	33,633	100,141	40,176	140,317
Aug.	130,913	46,183	128,981	48,115	177,096
Sept.	120,632	40,063	116,658	44,037	160,695
Oct.	138,610	51,319	139,953	49,976	189,929
Nov.	126,544	50,184	131,276	45,452	176,728
Dec.	119,762	45,348	123,448	41,662	165,110
1950	1,129,588	350,999	1,084,784	395,803	1,480,587
1949	962,601	297,369	n.a.	n.a.	1,259,970
1948	1,408,459	370,206	n.a.	n.a.	1,778,665
1947	1,259,492	373,224	n.a.	n.a.	1,632,716

U. S. Bureau of the Census n.a.=Not available

MALLEABLE IRON CASTINGS

Shipments—Net Tons

	For Sale	For Own Use	Total
1953			
9 Mos.	455,141	302,890	758,031
Jan.	53,272	33,977	87,249
Feb.	51,963	34,552	86,515
Mar.	57,025	37,456	94,481
Apr.	57,757	38,166	95,923
May	48,011	34,039	82,050
June	50,819	35,695	86,514
July	45,413	31,698	77,111
Aug.	45,415	28,440	73,855
Sept.	45,466	28,867	74,333
Oct.	.....	.....	.....
Nov.	.....	.....	.....
Dec.	.....	.....	.....
1952	573,472	352,648	926,120
Jan.	54,988	32,015	87,003
Feb.	50,129	32,769	82,898
Mar.	49,084	31,876	80,960
Apr.	56,337	32,933	89,270
May	51,476	30,294	81,770
June	46,511	27,935	74,446
July	29,675	15,591	45,266
Aug.	39,308	24,408	63,716
Sept.	45,849	30,101	75,950
Oct.	52,922	35,140	88,062
Nov.	46,708	29,391	76,099
Dec.	50,485	30,195	80,680
1951	656,076	429,165	1,085,241
Jan.	54,817	37,691	92,508
Feb.	54,915	34,035	88,950
Mar.	60,771	41,402	102,173
Apr.	58,199	39,722	97,921
May	61,918	39,427	101,345
June	57,176	37,200	94,376
July	45,072	31,754	76,826
Aug.	57,164	33,563	90,727
Sept.	48,568	33,708	82,276
Oct.	58,251	35,633	93,884
Nov.	53,682	34,528	88,210
Dec.	45,543	30,502	76,045
1950	536,945	405,279	942,224
1949	373,313	349,585	722,898
1948	527,192	413,992	941,184
1947	514,195	384,605	898,800
1946	452,355	299,673	752,028
1945	520,887	269,844	790,731
1944	619,588	258,645	878,233
1943	653,884	190,755	844,639
1942	590,804	155,204	746,008
1941	619,365	212,808	832,173
1940	400,818	155,391	556,209
1939	331,421	134,647	466,068
1938	208,597	87,406	296,003
1937	420,937	175,685	596,622

U. S. Bureau of the Census

HIGH ALLOY CASTINGS

Estimated Production by All United States Producers—Pounds

	Heat Resistant	Corrosion Resistant	Abrasion Resistant	Totals
1953	39,893,400†	29,166,400†	6,250,000†	75,309,800
1st Qtr.	10,281,900	7,286,300	778,600	18,346,800
2nd Qtr.	11,521,500	7,908,700	1,784,000	21,214,200
3rd Qtr.	9,090,000	6,771,400	2,187,400	18,048,800
4th Qtr.	9,000,000†	7,200,000†	1,500,000†	17,700,000†
1952	40,807,600	26,197,800	7,827,500	74,832,900
1st Qtr.	11,693,200	7,233,300	3,339,300	22,265,800
2nd Qtr.	10,014,400	6,422,700	2,193,900	18,631,000
3rd Qtr.	9,110,800	5,365,800	1,463,800	15,940,400
4th Qtr.	9,989,200	7,176,000	830,500	17,995,700

	Heat Resistant	Corrosion Resistant	Abrasion Resistant	Totals
1951	38,277,000	28,771,600	6,132,300	73,180,900
1950	26,894,000	19,033,200	3,321,200	49,248,400
1949	19,791,700	12,997,100	1,500,700	34,289,500
1948	24,030,400	16,285,200	2,525,300	42,840,900
1947	21,505,100	16,346,900	1,534,500	39,386,500
1946	20,398,800	15,150,400	1,860,700	37,409,900
1945	23,002,700	12,276,200	1,482,000	36,760,900
1944	27,698,800	9,662,100	1,365,700	38,726,600
1943	33,245,400	10,726,900	2,116,900	46,089,200
1942	31,020,900	10,490,500	1,212,600	42,724,000
1939	8,793,500	2,812,600	573,500	12,179,600

† Preliminary

Alloy Casting Institute

NONFERROUS CASTINGS

Zinc and Zinc-Base Alloy Castings

Shipments—Thousands of Pounds

	Die	All Other	Total
1953			
9 Mos.	401,801	3,913	405,714
Jan.	45,658	283	45,941
Feb.	46,335	248	46,583
Mar.	54,111	562	54,673
Apr.	50,932	524	51,456
May	43,996	475	44,471
June	48,639	412	49,051
July	38,934	426	39,360
Aug.	37,788	426	38,214
Sept.	38,408	557	38,965
Oct.	.....	.....	.....
Nov.	.....	.....	.....
Dec.	.....	.....	.....
1952	405,538	2,815	408,353
Jan.	36,027	206	36,233
Feb.	32,416	199	32,615
Mar.	33,085	179	33,264
Apr.	34,806	202	35,008
May	33,172	153	33,325
June	31,303	146	31,449
July	21,805	148	21,953
Aug.	27,419	203	27,622
Sept.	34,813	306	35,119
Oct.	42,523	329	42,852
Nov.	36,360	405	36,765
Dec.	41,809	339	42,148
1951	474,937	4,059	478,996
Jan.	43,613	481	44,094
Feb.	41,185	363	41,548
Mar.	46,540	440	46,980
Apr.	45,887	306	46,193
May	46,224	411	46,635
June	44,158	272	44,430
July	36,576	214	36,790
Aug.	39,328	301	39,629
Sept.	33,083	315	33,398
Oct.	38,251	300	38,551
Nov.	31,880	372	32,252
Dec.	28,212	284	28,496
1950	531,863	4,535	536,398
1949	397,001	3,561	400,562

U. S. Bureau of the Census

Magnesium and Magnesium-Base Alloy Castings

Shipments—Thousands of Pounds

	1953	1952	1951	1950	1949
Jan.	3,073	3,238	2,232	990	963
Feb.	3,225	3,057	2,315	913	952
Mar.	3,362	3,040	2,593	1,102	1,053
Apr.	3,294	2,793	2,728	978	865
May	2,679	2,734	2,819	995	921
June	3,136	2,703	2,135	958	935
July	2,372	2,405	2,036	861	830
Aug.	2,559	2,478	2,738	1,429	849
Sept.	2,524	3,090	2,398	1,544	861
Oct.		3,250	2,816	1,661	938
Nov.		2,959	3,406	1,873	945
Dec.		3,110	2,609	1,920	941

YEARLY SHIPMENTS

1952	34,857	1948	8,214
1951	30,825	1947	7,691
1950	15,224	1946	8,472
1949	11,053	1945	83,753

U. S. Bureau of the Census

Copper and Copper-Base Alloy Castings

Shipments—Thousands of Pounds

	Sand	Permanent Mold	Die	Other	Total
1953					
9 Mos.	682,791	45,277	7,634	22,006	757,708
Jan.	76,686	5,388	844	2,863	85,781
Feb.	76,847	5,061	843	2,432	85,183
Mar.	83,639	5,716	901	2,542	92,798
Apr.	85,471	5,462	893	2,536	94,362
May	76,912	4,855	895	2,561	85,223
June	76,333	4,706	872	2,745	84,656
July	64,451	3,926	691	1,973	71,041
Aug.	70,557	4,890	854	2,056	78,357
Sept.	71,895	5,273	841	2,298	80,307
Oct.	.....	.....	.....	.....	.....
Nov.	.....	.....	.....	.....	.....
Dec.	.....	.....	.....	.....	.....
1952	910,862	63,865	8,259	26,924	1,009,910
Jan.	81,479	6,325	804	2,245	90,853
Feb.	79,091	5,251	698	2,543	87,583
Mar.	80,857	6,229	624	2,507	90,217
Apr.	76,947	5,949	719	2,343	85,958
May	75,072	5,458	586	2,285	83,401
June	69,014	4,906	672	2,176	76,768
July	60,249	3,669	515	1,744	66,177
Aug.	71,273	5,154	595	1,776	78,798
Sept.	78,278	4,680	672	2,185	85,815
Oct.	84,544	5,518	805	2,235	93,102
Nov.	72,281	5,011	765	2,382	80,439
Dec.	81,777	5,715	804	2,503	90,799
1952	910,862	63,865	8,259	26,924	1,009,910
1951	1,075,437	69,883	12,516	39,607	1,197,443
1950	953,590	55,614	15,099	32,670	1,056,973
1949	671,080	38,767	9,499	24,475	743,821
1948	947,044	60,552	13,642	29,217	1,050,455
1947	969,261	51,800	13,138	27,663	1,061,862
1946	974,019	56,071	10,651	24,855	1,065,596
1945	.....	.....	.....	.....	1,008,000
1944	.....	.....	.....	.....	1,446,200

U. S. Bureau of the Census

Aluminum and Aluminum-Base Alloy Castings

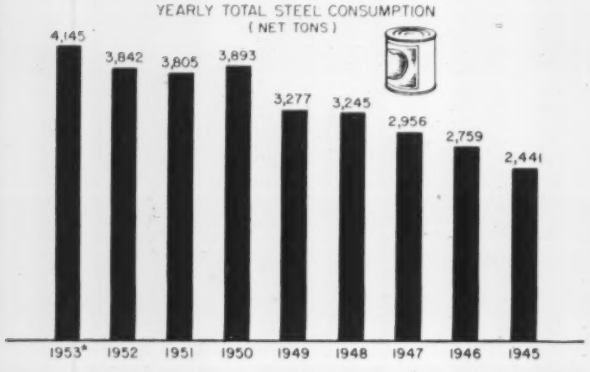
Shipments—Thousands of Pounds

	Sand	Permanent Mold	Die	Other	Total
1953					
9 Mos.	165,158	150,857	183,442	3,018	502,475
Jan.	19,158	16,147	20,052	272	55,629
Feb.	17,583	16,698	20,272	311	54,864
Mar.	18,989	17,865	22,255	314	59,423
Apr.	20,009	18,583	22,620	370	61,582
May	19,600	16,479	21,208	315	57,602
June	19,330	15,535	21,675	280	56,820
July	16,664	15,733	18,915	341	51,653
Aug.	16,007	16,294	18,200	399	50,900
Sept.	17,818	17,523	18,245	416	54,002
Oct.	.....	.....	.....	.....	.....
Nov.	.....	.....	.....	.....	.....
Dec.	.....	.....	.....	.....	.....
1952	194,616	146,883	169,732	7,748	518,979
Jan.	16,173	10,286	12,758	467	40,224
Feb.	15,534	11,819	11,986	689	40,028
Mar.	16,785	11,923	12,040	688	41,436
Apr.	17,048	12,678	13,390	855	43,971
May	15,984	12,297	12,717	1,096	42,094
June	15,989	10,255	12,657	966	39,867
July	14,014	9,232	11,302	727	35,275
Aug.	15,834	10,493	11,730	1,140	39,197
Sept.	16,733	12,515	15,888	294	45,430
Oct.	17,826	15,191	18,284	330	51,631
Nov.	15,419	13,463	17,372	229	46,843
Dec.	17,277	16,191	19,608	267	53,343
1952	194,616	146,883	169,732	7,748	518,979
1951	193,378	160,011	151,465	10,277	515,131
1950	184,782	181,366	167,201	9,733	543,082
1949	122,604	123,523	98,340	7,311	351,778
1948	153,845	183,627	128,903	5,242	471,617
1947	163,321	186,783	115,644	2,090	467,838
1946	160,845	153,138	73,702	1,026	388,711
1945	213,892	108,259	70,667	2,189	395,007
1944	321,200	106,200	84,200	2,800	514,400

U. S. Bureau of the Census

METAL CANS

Shipments in Terms of Net Tons of Steel Consumed



	Food Cans	Nonfood Cans	Total	For Sale
1953				
9 Mos.	2,060,669	1,144,077	3,204,746	2,803,885
Jan.	167,764	101,833	269,597	226,078
Feb.	151,200	100,884	252,084	215,587
Mar.	161,854	117,518	279,372	238,914
Apr.	174,879	129,322	304,201	255,358
May	177,976	126,767	304,743	259,360
June	220,481	136,720	357,201	311,009
July	299,306	147,466	446,772	407,362
Aug.	360,564	145,651	506,215	457,387
Sept.	346,645	137,916	484,561	432,830
Oct.	.....	.....	.....	.....
Nov.	.....	.....	.....	.....
Dec.	.....	.....	.....	.....
1952	2,554,874	1,287,296	3,842,170	3,340,899
Jan.	143,997	90,375	234,372	195,980
Feb.	144,439	91,209	235,648	199,445
Mar.	157,279	109,641	266,920	228,841
Apr.	173,414	113,809	287,223	241,186
May	175,158	102,471	277,629	239,311
June	218,947	114,469	333,416	287,127
July	293,370	130,524	423,894	388,040
Aug.	348,906	116,914	465,820	421,221
Sept.	348,500	111,655	460,155	405,368
Oct.	240,136	115,182	355,318	306,570
Nov.	152,116	92,920	245,036	208,128
Dec.	158,612	98,127	256,739	219,682
1951	2,558,591	1,245,960	3,804,551	3,309,592
Jan.	160,993	111,336	272,329	234,832
Feb.	148,969	90,990	239,959	204,336
Mar.	165,194	103,168	268,362	224,464
Apr.	169,618	106,706	276,324	234,784
May	206,284	102,076	308,360	259,480
June	218,952	90,567	309,519	267,233
July	263,719	92,638	356,357	318,391
Aug.	367,257	115,931	483,188	428,044
Sept.	306,610	110,768	417,378	371,686
Oct.	254,635	119,565	374,200	333,018
Nov.	156,035	107,433	263,468	229,422
Dec.	140,325	94,782	235,107	203,902
1950	2,550,949	1,342,435	3,893,384	3,423,602
1949	2,261,432	1,015,493	3,276,925	2,845,709
1948	2,317,487	927,658	3,245,145	2,771,104
1947	2,146,601	809,515	2,956,116	2,499,621
1946	2,305,359	454,160	2,759,519	2,348,681
1945	2,030,277	411,297	2,441,574	*2,275,438

U. S. Bureau of the Census

* Estimated

Commercial Closures

Production—In Thousands

	Metal Caps	Plastic Caps†
1953		
9 Mos.	9,326,086	2,054,158
Jan.	962,851	223,261
Feb.	917,874	220,343
Mar.	1,046,569	249,043
Apr.	1,093,011	245,448
May	1,079,485	227,828
June	1,121,210	226,625
July	1,073,107	207,616
Aug.	1,041,456	218,426
Sept.	990,523	235,568
Oct.	.....	.....
Nov.	.....	.....
Dec.	.....	.....
1952	10,569,644	2,178,534
Jan.	764,616	225,558
Feb.	728,304	183,381
Mar.	804,518	174,027
Apr.	920,014	199,266
May	917,418	165,853
June	881,070	141,427
July	868,106	142,972
Aug.	952,943	173,524
Sept.	953,762	191,756
Oct.	1,020,205	209,210
Nov.	812,809	179,337
Dec.	945,879	192,223
1951	11,449,204	2,850,886
1950	11,688,624	2,562,821
1949	8,109,483	1,951,992
1948	8,784,758	1,994,976

† Not including caps for collapsible tubes.
U. S. Bureau of the Census

Tin Mill Products Consumed in Producing Closures

Consumption in Terms of Base Boxes

	Commercial Metal Caps	Crowns	Home Canning Closures
1953			
9 Mos.	1,955,826	2,478,555	577,851
Jan.	202,085	259,618	52,281
Feb.	194,083	240,528	65,246
Mar.	241,930	266,399	72,389
Apr.	263,889	272,435	80,195
May	225,902	286,584	86,033
June	231,579	306,529	81,924
July	208,826	297,433	58,330
Aug.	200,582	284,446	49,796
Sept.	186,950	264,583	36,657
Oct.	.....	.....	.....
Nov.	.....	.....	.....
Dec.	.....	.....	.....
1952	2,250,732	3,286,200	624,017
Jan.	167,394	224,952	52,116
Feb.	163,026	236,811	66,994
Mar.	190,632	252,218	76,446
Apr.	196,737	271,028	73,104
May	200,499	296,778	67,389
June	198,727	294,224	57,625
July	192,565	267,203	38,263
Aug.	207,522	286,481	34,032
Sept.	196,143	323,854	32,660
Oct.	187,145	329,529	40,914
Nov.	163,941	244,863	35,648
Dec.	186,401	258,259	48,826
1951	2,325,417	3,237,970	681,438
1950	2,603,125	3,400,418	.....

U. S. Bureau of the Census

Crowns

Production—In Gross

	1953	1952	1951
Jan.	26,616,290	22,716,564	30,924,924
Feb.	24,696,062	24,315,848	29,040,169
Mar.	27,626,913	25,357,160	34,005,978
Apr.	27,771,536	27,773,664	31,453,286
May	29,316,636	30,240,777	30,282,249
June	31,605,187	30,772,916	28,460,663
July	30,751,510	28,531,306	26,860,596
Aug.	29,154,952	29,461,913	33,637,583
Sept.	27,243,939	33,060,167	24,691,864
Oct.	.....	33,467,144	24,625,215
Nov.	.....	24,875,096	19,900,328
Dec.	.....	27,001,931	16,902,625
Total	.....	337,574,486	330,785,480

YEARLY TOTALS

1950 ..... 344,196,185 1949 284,537,496

U. S. Bureau of the Census

Aluminum Consumed in Producing Closures

Pounds

	Commercial Closures	Milk Bottle Closures	Foil Liners	Total
1953				
Jan.	574,760	392,761	151,093	1,118,614
Feb.	496,691	391,628	156,151	1,044,470
Mar.	640,807	422,621	173,362	1,236,830
Apr.	647,742	378,746	185,458	1,211,946
May	705,214	352,246	234,473	1,291,933
June	610,022	375,907	257,517	1,243,446
July	720,033	392,490	262,699	1,375,222
Aug.	783,096	377,320	263,178	1,423,594
Sept.	586,349	388,719	244,359	1,219,427
1952				
Aug.	432,413	333,859	240,466	1,006,738
Sept.	507,056	397,363	264,363	1,168,782
Oct.	497,139	414,460	225,271	1,136,870
Nov.	467,415	439,925	143,923	1,051,263
Dec.	553,522	416,035	169,707	1,139,264

Heavy Steel Barrels and Drums

Shipments for Sale—Number of Units

	1953	1952	1951
Jan.	1,797,506	2,085,445	2,765,782
Feb.	1,669,709	1,961,084	2,312,972
Mar.	1,981,128	2,007,747	2,761,637
Apr.	2,067,720	2,207,351	2,383,932
May	2,053,829	2,117,392	2,605,254
June	2,086,112	1,655,204	2,631,655
July	1,975,012	1,628,502	2,365,606
Aug.	2,025,511	1,963,642	2,780,997
Sept.	1,950,491	2,187,581	2,321,837
Oct.	.....	2,276,777	2,510,655
Nov.	.....	1,891,676	2,146,732
Dec.	.....	2,045,890	2,175,931

YEARLY TOTALS

1952	24,028,291	1944	19,931,227
1951	29,762,990	1943	27,219,206
1950	26,240,548	1942	21,234,721
1949	23,109,638	1941	18,332,143
1948	27,069,717	1940	13,556,443
1947	27,061,963	1939	12,158,445
1946	22,729,346	1938	8,550,299
1945	22,251,101	1937	9,869,212

Light Steel Barrels and Drums

Shipments for Sale—Number of Units

	1953	1952	1951
Jan.	651,178	635,000	765,395
Feb.	585,598	586,075	641,537
Mar.	640,831	614,497	747,745
Apr.	735,195	741,842	695,253
May	706,174	685,308	817,546
June	709,566	529,572	781,015
July	656,568	588,749	684,319
Aug.	578,605	612,130	724,636
Sept.	640,062	573,438	608,393
Oct.	.....	751,580	630,830
Nov.	.....	591,019	624,022
Dec.	.....	693,309	569,649

YEARLY TOTALS

1952	7,602,519	1944	5,173,000
1951	8,290,340	1943	3,941,426
1950	7,816,535	1942	4,541,108
1949	6,079,913	1941	3,757,565
1948	7,346,312	1940	2,805,284
1947	6,032,304	1939	2,592,129
1946	6,432,138	1938	1,964,951
1945	6,564,746	1937	2,145,766

Steel Shipping Packages, Kegs and Pails

Shipments for Sale—Number of Units

	1953	1952	1951
Jan.	4,783,615	4,669,367	5,956,581
Feb.	4,726,983	4,387,099	5,448,459
Mar.	5,322,606	4,771,698	6,874,845
Apr.	6,305,655	5,275,376	6,875,025
May	6,023,999	5,462,397	7,046,989
June	6,225,714	4,613,961	7,100,946
July	6,097,670	4,156,068	6,532,309
Aug.	5,459,040	4,983,748	7,058,276
Sept.	5,836,099	6,068,495	5,679,750
Oct.	.....	6,610,719	5,626,639
Nov.	.....	5,214,763	5,220,148
Dec.	.....	5,072,061	4,261,213

YEARLY TOTALS

1952	61,285,782	1949	52,761,170
1951	73,681,180	1948	57,254,935
1950	66,128,702	1947	57,581,115

U. S. Bureau of the Census

STEEL & IRON REQUIRED FOR MODERN-DAY PRODUCTS

Figures show pounds required to make item or required for installation except where finished weight is specified. The weights are not intended to be typical or average. Rather, they are for particular models or types.

PRODUCT	Date estimate was published	IRON AND STEEL (pounds)
Bus (50) seats	Dec. 1951	12,918
Desk (60 x 30 x 29 inches), finished weight	Dec. 1952	245.81
Freight Cars:	June 1949	
Box Car (40 ft 6 in.), 50-ton capacity		41,540
Covered Hopper, 70-ton capacity		52,940
Flat, 50-ton capacity		47,660
Hopper, 50-ton capacity		41,920
Ore, 70-ton capacity		42,300
Refrigerator, 40-ton capacity		43,940
Grain Combine	June 1950	6,829.77
Hay Baler (10 tons per hour capacity)	Oct. 1951	3,716.58
Lathe, Turret (standard size)	Apr. 1947	8,056
Locomotive, Diesel-Electric,1500 hp	Apr. 1949	200,700
Motor, Electric (finished weight), ¼ hp	June 1952	19
Motor, Electric (finished weight), 5000 hp	June 1952	168,000
Printing Press (4-color, sheet fed gravure)	Oct. 1950	110,900
Railroad Freight Car Truck	Oct. 1949	6,868
Railroad Passenger Car Truck	Oct. 1949	18,460
Railroad Sleeping Car (21-roomette)	June 1951	115,662
Ship, "Independence"	Aug. 1951	36,090,000
		STEEL‡
Automobile (1952 model 4-door sedan)	Oct. 1953	3,542
Bicycle (man's 26-inch deluxe)	Oct. 1952	63.81
Containers, by types (finished weights):	Feb. 1948	
Baby Food		1.888 oz
Condensed Milk		2.48 oz
Fish (Sardine, No. 1 flat)		2.5 oz
Fish (Tuna, No. 1)		3.168 oz
Fruit (No. 3)		5.344 oz
Fruit Juice (No. 10)		11.08 oz
Grease (1-pound)		3.776 oz
Lard (3-pound)		8.288 oz
Meat (Square, 12-ounce)		2.848 oz
Olive Oil (Square, 1-quart)		4.96 oz
Paint (1-gallon)		15.968 oz
Soup (No. 2)		3.808 oz
Vegetable (No. 5)		5.92 oz
House, Six-Room* (finished weights):	Oct. 1949	
Bathroom		300
Conduit		140
Doors, Steel		160
Flashing and Miscellaneous Sheets		200
Frames and Sills		480
Gutters and Downspouts		475
Hardware		90
Heating Equipment		640
Kitchen (see below)		...
Lath		1,800
Laundry (see below)		...
Nails and Wire		600
Pipe		1,200
Radiator Grills		75
Screen		32
Structural Shapes and Columns		680
Windows		800
Kitchen—Laundry Combination† (finished weights):	Apr. 1953	
Clothes Dryer		216
Clothes Washer		216
Dish Washer with Cabinet		150
Electrical Raceway System		63
Freezer		283
Garbage Disposal Unit		15
Ironer		186
Kitchen Cabinets		887
Metal Table with Porcelain Enamel Top		35
Mixer		8
Refrigerator		229
Sink Bowl (double)		22
Stainless Trim for Counter Edge		2
Steel Stool		15
Stove		254
Toaster		7
Utensils and Cutlery		50
Venetian Blinds (2)		14
Ventilator for Stove		7
Lawn Mower (hand operated)	June 1947	27.60
Refrigerator (home, electric)	June 1947	171.66
Tools, Hand:	Feb. 1953	
Ball Peen Hammer		1.64
Chisel		6.8 oz
Combination Pliers		10.8 oz
Crow Bar		19.08
Drift Pin		1.1
Four-Way Wrench		2.33
Mattock		5.3
Maul		10.6
Mechanic's Double End Wrench		0.442
Pick		6.36
Sledge		10.6
Solid Punch		2.18 oz
Standard Screw Driver		0.27
Timber Felling Wedge		5.3
Wrench		2.75
Tractor, Farm (wheel type)	Dec. 1946	1,542 ±2

*Not all the uses listed are necessarily found together in the same house, although they may be. The list indicates where steel has been found advantageous.
† List does not give all possible uses of steel in a kitchen, and is intended only to indicate the many functions of steel in a modern kitchen.
‡ Iron, if any, not determined. In pounds unless otherwise indicated.

American Iron & Steel Institute

1953 WEEKLY INDEX OF FINISHED STEEL PRICES

U. S. Bureau of Labor Statistics—1947-1949=100
(Figures are given from date the index was revised in 1953.)

Week Ended	Index	Week Ended	Index	Week Ended	Index
Apr. 21	131.1	July 7	141.6	Oct. 6	141.6
Apr. 28	131.7	July 14	141.7	Oct. 13	141.5
Apr. Av.	130.7	July 21	141.7	Oct. 20	141.5
		July 28	141.7	Oct. 27	141.5
		July Av.	141.7	Oct. Av.	141.5
May 5	133.6				
May 12	134.2	Aug. 4	141.7	Nov. 3	141.5
May 19	135.8	Aug. 11	141.7	Nov. 10	141.5
May 26	136.2	Aug. 18	141.7	Nov. 17	141.5
May Av.	134.2	Aug. 25	141.7	Nov. 24	141.5
		Aug. Av.	141.7	Nov. Av.	141.5
June 2	136.3	Sept. 1	141.7	Dec. 1	141.5
June 9	136.3	Sept. 8	141.7	Dec. 8	141.5
June 16	136.3	Sept. 15	141.7	Dec. 15	....
June 23	141.0	Sept. 22	141.7	Dec. 22	....
June 30	141.2	Sept. 29	141.7	Dec. 29	....
June Av.	136.3	Sept. Av.	141.7	Dec. Av.	....

Beehive Metallurgical Coke

Average Price—Net Ton

	1953	1952	1951	1950
Connellsville, furnace	$14.75	$14.75	$14.75	$14.06
Connellsville, foundry	16.82	17.24	17.50	15.88

Oven Foundry Coke

Average Price—Net Ton

Ovens	1953	1952	1951	1950
Kearney, N. J.	$24.00	$22.85	$22.75	$22.18
Milwaukee	25.25	23.88	23.75	21.18
Chicago	24.50	23.13	22.83	22.00

Lake Superior Iron Ore

(Per gross ton; 51½% iron)

	1953	1952	1951	1950
Bessemer Old Range	$10.04	$9.02	$8.70	$8.10
Bessemer Mesabi	9.79	8.77	8.45	7.85
Nonbessemer Old Range	9.89	8.87	8.55	7.95
Nonbessemer Mesabi	9.64	8.62	8.30	7.70
High Phosphorus	9.64	8.62	8.30	7.70

FINISHED STEEL—WEIGHTED PRICE COMPOSITE

(Based on average shipments and prices of the following products during 5-year base period 1935-1939: Structural shapes, plates, rails, hot-rolled and cold-finished bars, pipe, wire, nails, tin plate, hot and cold-rolled sheets, galvanized sheets, hot and cold-rolled strip)

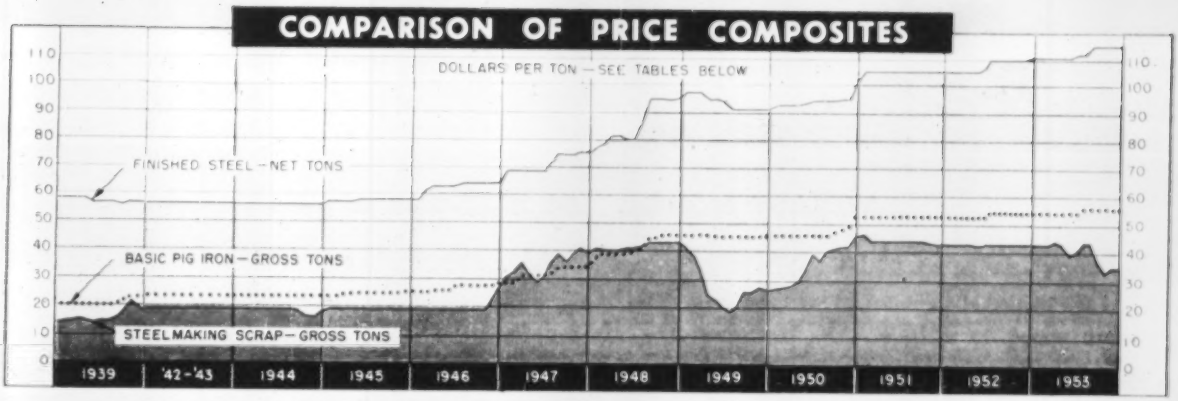
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Avg.
1953	181.31	181.31	181.31	181.31	182.24	186.06	189.35	189.38	189.80	189.91	189.91	189.74	185.97
1952	171.92	171.92	171.92	171.92	171.92	171.92	173.83	181.31	181.31	181.31	181.31	181.31	175.99
1951	171.92	171.92	171.92	171.92	171.92	171.92	171.92	171.92	171.92	171.92	171.92	171.92	171.92
1950	156.13	156.13	156.13	156.13	156.13	156.54	156.69	156.95	156.99	157.53	157.76	167.87	157.57
1949	155.05	155.05	154.85	154.01	152.90	152.90	152.80	152.52	152.52	152.52	152.52	154.75	153.53
1948	132.93	134.56	135.91	135.91	135.02	134.56	143.08	151.99	151.86	151.86	151.86	151.86	142.62
1947	117.90	118.67	118.67	118.67	118.67	118.67	120.39	128.96	128.96	128.96	129.28	129.28	123.09
1946	101.87	106.82	111.62	111.62	111.62	111.86	112.04	112.04	112.04	112.04	112.04	112.82	110.70
1945	100.32	100.65	100.65	100.65	101.10	101.78	101.78	101.85	101.87	101.87	101.87	101.87	101.36
1944	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16
1943	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16
1942	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16
1941	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16
1940	99.16	99.16	99.16	97.75	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.04
1939	100.50	100.50	100.50	100.50	99.07	98.46	98.42	98.42	98.42	98.54	98.78	99.16	99.27
1938	109.94	109.73	109.65	109.65	109.65	107.84	101.84	101.84	101.78	101.31	100.83	100.50	105.38

FINISHED STEEL—ANNUAL PRICE AVERAGES

(Per net ton, Pittsburgh)

	SHEETS			STRIP		Tin	BARS				Basic	Standard
	H.R.	C.R.	Gal.	H.R.	C.R.	Plate	H.R.	C.F.	Plates	Shapes	Wire	Nails
1953	$77.60	$93.70	$103.70	$85.34	$111.25	$179.00	$81.20	$101.52	$80.20	$79.75	$108.26	$129.08
1952	74.52	88.95	98.38	79.51	104.39	176.17	76.17	94.25	75.73	74.73	101.88	123.03
1951	73.00	87.00	96.00	77.60	101.60	174.00	74.00	91.00	74.00	73.00	98.60	120.00
1950	67.50	82.42	88.67	68.33	86.29	150.00	69.42	83.29	70.33	68.42	91.13	107.67
1949	65.22	80.08	88.00	67.75	84.33	155.00	67.55	80.04	68.75	65.24	84.05	105.92
1948	60.17	74.83	82.80	62.40	80.36	135.75	62.84	75.63	63.84	60.17	80.10	107.33
1947	52.60	67.03	74.05	52.60	67.03	116.00	54.60	67.03	55.53	52.53	70.67	84.44
1946	48.03	64.80	79.50	47.33	60.56	104.38	49.46	61.21	49.38	46.38	60.25	69.61
1945	43.92	61.00	73.50	42.00	56.00	100.00	44.25	53.83	44.50	42.00	53.83	57.08
1944	42.00	61.00	70.00	42.00	56.00	100.00	43.00	53.00	42.00	42.00	52.00	51.00
1943	42.00	61.00	70.00	42.00	56.00	100.00	43.00	53.00	42.00	42.00	52.00	51.00
1942	42.00	61.00	70.00	42.00	56.00	100.00	43.00	53.00	42.00	42.00	52.00	51.00
1941	42.00	61.00	70.00	42.00	56.00	100.00	43.00	53.00	42.00	42.00	52.00	51.00
1940	41.80	60.80	70.00	41.75	55.75	100.00	43.00	53.00	42.00	42.00	52.00	51.00
1939	41.25	62.08	70.00	41.25	57.08	100.00	43.75	53.33	42.00	42.00	52.00	49.17
1938	45.42	66.67	72.92	45.25	61.08	106.00	47.00	56.00	43.50	43.50	55.00	52.00
1937	47.08	69.92	74.50	47.08	62.75	104.33	48.08	56.75	44.25	44.25	56.92	53.25
1936	38.25	60.00	63.25	38.25	52.33	105.00	38.50	44.42	37.00	37.00	48.17	42.83
1935	37.00	59.00	62.00	37.00	52.00	105.00	36.33	40.00	36.00	36.00	46.00	50.58
1934	37.08	58.75	61.25	37.17	51.75	105.00	36.17	42.00	35.67	35.67	45.42	50.58
1933	33.17	51.83	54.92	31.83	42.17	88.67	32.75	36.08	32.17	32.50	42.25	39.92
1932	34.08	55.17	56.33	28.92	39.75	93.75	31.67	35.75	31.67	31.67	44.00	39.00
1931	37.25	62.83	57.58	30.58	43.33	98.75	32.50	41.67	32.33	32.08	44.00	37.75
1930	40.17	73.00	63.00	33.67	49.33	103.75	34.42	41.83	34.17	34.17	46.67	42.50

COMPARISON OF PRICE COMPOSITES



FINISHED STEEL—ARITHMETICAL PRICE COMPOSITE

(In dollars per net ton, computed from industry-wide prices on carbon steel: Hot-rolled sheets, cold-rolled sheets, cold-rolled strip, hot-rolled bars, plates, structural shapes, basic wire, standard nails, tin plate, and standard and line pipe. Based on basing point prices through June, 1948; mill prices for subsequent months.)

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Avg.
1953	$110.98	$110.98	$110.98	$110.98	$111.13	$112.49	$112.51	$113.56	$115.56	$115.42	$115.42	$114.70	$113.06
1952	106.32	106.32	106.32	106.32	106.32	106.32	107.25	110.98	110.98	110.98	110.98	110.98	108.34
1951	106.32	106.32	106.32	106.32	106.32	106.32	106.32	106.32	106.32	106.32	106.32	106.32	106.32
1950	92.92	93.09	93.18	93.19	93.65	94.35	94.36	94.44	94.50	94.91	95.09	100.76	94.54
1949	97.75	97.77	97.17	94.18	93.36	92.06	91.82	91.62	91.55	91.62	91.64	91.89	93.54
1948	78.26	79.86	81.14	81.14	80.27	80.27	86.18	95.05	95.05	95.05	95.16	95.50	86.91
1947	69.59	69.82	69.82	69.82	69.82	69.82	70.80	75.41	75.41	75.41	76.09	76.15	72.33
1946	58.27	60.91	63.54	63.54	63.54	64.09	64.45	64.45	64.45	64.45	64.45	64.75	63.41
1945	57.35	57.55	57.55	57.55	57.73	58.27	58.27	58.27	58.27	58.27	58.27	58.27	57.97
1944	56.73	56.73	56.73	56.73	56.73	56.73	56.73	56.73	56.73	56.73	56.73	56.73	56.73
1943	56.73	56.73	56.73	56.73	56.73	56.73	56.73	56.73	56.73	56.73	56.73	56.73	56.73
1942	56.73	56.73	56.73	56.73	56.73	56.73	56.73	56.73	56.73	56.73	56.73	56.73	56.73
1939	57.36	57.36	57.36	57.36	56.74	56.63	56.29	56.27	56.27	56.49	56.54	56.73	56.76

BASIC PIG IRON PRICE COMPOSITE

Average of basic pig iron prices (per gross ton) at Bethlehem, Birmingham, Buffalo, Chicago, Cleveland, Pittsburgh, Granite City, Youngstown.

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Avg.
1953	$54.66	$54.66	$54.66	$54.66	$54.66	$54.66	$56.03	$56.04	$56.04	$56.04	$56.04	$56.04	$55.35
1952	52.16	52.16	52.16	52.16	52.16	52.16	52.66	54.66	54.66	54.66	54.66	54.66	53.24
1951	52.16	52.16	52.16	52.16	52.16	52.16	52.16	52.16	52.16	52.16	52.16	52.16	52.16
1950	45.70	45.97	45.97	45.97	45.97	45.97	45.97	45.97	47.08	47.98	49.04	52.16	46.98
1949	46.26	46.22	46.22	46.16	45.66	45.60	45.60	45.60	45.60	45.60	45.60	45.60	45.81
1948	38.50	39.30	39.34	39.21	39.66	40.49	41.42	44.12	44.62	46.19	46.29	46.29	42.12
1947	29.56	29.59	32.40	32.49	32.49	*32.49	33.82	36.06	36.14	36.18	36.38	36.31	33.66
1946	24.75	24.75	25.13	25.50	25.50	27.50	27.50	27.50	27.50	27.50	27.50	29.10	26.64
1945	23.00	23.50	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.19	24.75	24.75	24.01
1944	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00
1943	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00
1942	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00
1939	20.05	20.05	20.05	20.05	20.05	20.05	20.05	20.05	21.05	22.05	22.05	22.05	20.68

MALLEABLE PIG IRON PRICE COMPOSITE

Average of malleable pig iron prices (per gross ton) at Bethlehem, Buffalo, Chicago, Cleveland, Pittsburgh, Granite City, Youngstown.

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Avg.
1953	$55.77	$55.77	$55.77	$55.77	$55.77	$55.77	$57.27	$57.27	$57.27	$57.27	$57.27	$57.27	$56.52
1952	53.27	53.27	53.27	53.27	53.27	53.27	53.77	55.77	55.77	55.77	55.77	55.77	54.35
1951	53.27	53.27	53.27	53.27	53.27	53.27	53.27	53.27	53.27	53.27	53.27	53.27	53.27
1950	47.27	47.27	47.27	47.27	47.27	47.27	47.33	47.49	48.15	49.46	50.27	53.27	48.30
1949	47.39	47.34	47.34	47.31	47.27	47.27	47.27	47.27	47.27	47.27	47.27	47.27	47.30
1948	39.58	40.39	40.45	40.29	40.70	41.54	42.32	44.87	45.30	47.20	47.41	47.41	43.12
1947	30.79	30.79	33.50	33.71	33.71	33.71	34.94	37.07	37.16	37.19	37.49	37.40	34.79
1946	26.04	26.04	26.41	26.79	26.79	28.79	28.79	28.79	28.79	28.79	28.79	30.36	27.93
1945	24.29	24.79	25.29	25.29	25.29	25.29	25.29	25.29	25.29	25.48	26.04	26.04	25.31

No. 2 FOUNDRY PIG IRON PRICE COMPOSITE

Average of No. 2 foundry pig iron prices (per gross ton) at Bethlehem, Birmingham, Buffalo, Chicago, Cleveland, Neville Island, Granite City, Youngstown.

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Avg.
1953	$55.04	$55.04	$55.04	$55.04	$55.04	$55.04	$56.54	$56.54	$56.54	$56.54	$56.54	$56.54	$55.79
1952	52.54	52.54	52.54	52.54	52.54	52.54	53.04	55.04	55.04	55.04	55.04	55.04	53.62
1951	52.54	52.54	52.54	52.54	52.54	52.54	52.54	52.54	52.54	52.54	52.54	52.54	52.54
1950	46.20	46.47	46.47	46.47	46.47	46.47	46.57	46.85	47.55	49.20	49.54	52.54	47.57
1949	46.67	46.63	46.63	46.60	46.13	46.07	46.08	46.10	46.10	46.10	46.10	46.10	46.28
1948	38.94	39.77	39.81	39.68	40.10	40.96	41.83	44.47	44.58	46.50	46.69	46.69	42.50
1947	30.17	30.17	32.80	32.99	32.99	32.99	34.32	36.54	36.62	36.64	36.85	36.78	34.16
1946	25.42	25.42	25.80	26.17	26.17	28.17	28.17	28.17	28.17	28.17	28.17	29.73	27.31
1945	23.67	24.17	24.67	24.67	24.67	24.67	24.67	24.67	24.67	24.86	25.42	25.42	24.69

STEELMAKING SCRAP PRICE COMPOSITE

Average of No. 1 heavy melting steel scrap prices (per gross ton) at Pittsburgh, Chicago and eastern Pennsylvania.

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Avg.
1953	$43.00	$43.00	$44.05	$42.88	$39.17	$40.50	$43.51	$43.40	$36.93	$32.75	$35.00	$32.80	$39.75
1952	43.00	43.00	43.00	43.00	43.00	42.63	42.60	43.00	43.00	43.00	43.00	43.00	42.94
1951	46.33	44.00	44.00	44.00	44.00	44.00	44.00	44.00	44.00	43.60	43.00	43.00	43.99
1950	26.93	27.52	28.23	29.40	33.82	39.25	37.04	40.00	40.93	41.37	41.33	45.50	35.94
1949	41.54	38.48	34.60	24.06	22.29	20.85	19.21	20.86	26.07	26.71	28.96	28.03	27.64
1948	40.75	40.48	40.21	40.41	40.67	40.67	41.43	43.33	43.33	43.25	43.25	43.25	41.75
1947	31.20	33.50	37.25	33.94	29.75	32.48	37.23	39.00	37.83	39.85	40.42	40.13	36.05
1946	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.17	22.22	27.69	20.13
1945	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.17
1944	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.17	18.00	16.50	16.40	18.54	18.95
1943	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.17
1942	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.17
1939	14.90	14.95	15.15	14.80	14.10	14.60	14.90	15.35	18.15	21.55	20.15	17.95	16.40

Prices

METALWORKING FACTS AND FIGURES

AVERAGE MONTHLY QUOTATIONS IN 1953

Finished Steel Prices are cents per pound unless otherwise noted; coke, dollars per net ton; other products, dollars per gross ton. All prices are mill or furnace, unless otherwise noted. December figures subject to revision.

PITTSBURGH	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.
Structural Shapes	3.85	3.85	3.85	3.85	3.85	4.00	4.10	4.10	4.10	4.10	4.10	4.10
Plates	3.90	3.90	3.90	3.90	3.90	4.02	4.10	4.10	4.10	4.10	4.10	4.10
Bars, Hot-Rolled	3.95	3.95	3.95	3.95	3.95	4.07	4.15	4.15	4.15	4.15	4.15	4.15
Bars, Cold-Finished	4.925	4.925	4.925	4.925	4.925	5.09	5.20	5.20	5.20	5.20	5.20	5.20
Sheets, Hot-Rolled	3.825	3.825	3.825	3.825	3.825	3.885	3.925	3.925	3.925	3.925	3.925	3.925
Sheets, Cold-Rolled	4.575	4.575	4.575	4.575	4.575	4.695	4.775	4.775	4.775	4.775	4.775	4.775
Sheets, No. 10 Galvanized	5.075	5.075	5.075	5.075	5.075	5.195	5.275	5.275	5.275	5.275	5.275	5.275
Strip, Hot-Rolled	4.10	4.10	4.10	4.10	4.10	4.16	4.419	4.425	4.425	4.425	4.425	4.425
Strip, Cold-Rolled	5.533	5.533	5.533	5.533	5.533	5.55	5.617	5.617	5.617	5.617	5.617	5.45
Standard Spikes	6.65	6.65	6.65	6.65	6.65	6.75	7.05	7.05	7.05	7.05	7.05	7.05
Plain Wire	5.308	5.308	5.308	5.308	5.308	5.428	5.358	5.525	5.525	5.525	5.525	5.525
Wire Nails	6.35	6.35	6.35	6.35	6.35	6.403	6.55	6.55	6.55	6.55	6.55	6.55
Structural Rivets	7.85	7.85	7.85	8.50	8.50	8.50	8.90	8.90	8.90	8.90	8.90	8.90
Steel Pipe, Buttweld 1-3 in., % discount from list	39	39	39	39	37.88	36.70	35.50	35.50	34.56	34.25	34.25	34.25
Tin Plate, 1.50-pound coating (base box)	$8.95	$8.95	$8.95	$8.95	$8.95	$8.95	$8.95	$8.95	$8.95	$8.95	$8.95	$8.95
Pig Iron, Bessemer, Neville Island	55.50	55.50	55.50	55.50	55.50	55.50	57.00	57.00	57.00	57.00	57.00	57.00
Pig Iron, Basic, Pittsburgh district ovens	55.50	55.50	55.50	55.50	55.50	55.50	56.00	56.00	56.00	56.00	56.00	56.00
Pig Iron, No. 2 Foundry, Neville Island	55.00	55.00	55.00	55.00	55.00	55.00	56.50	56.50	56.50	56.50	56.50	56.50
Pig Iron, Malleable, Neville Island	55.00	55.00	55.00	55.00	55.00	55.00	56.50	56.50	56.50	56.50	56.50	56.50
Blast Furnace Silvery Pig Iron, 9.01-9.50% Si, Jackson, O., furnace	74.50	74.50	74.50	74.50	74.50	74.50	76.00	76.00	76.00	76.00	76.00	76.00
Billets, Bessemer and Open-Hearth, Rerolling	59.00	59.00	59.00	59.00	59.00	60.20	62.00	62.00	62.00	62.00	62.00	62.00
Wire Rods (cents per pound)	4.425	4.425	4.425	4.425	4.425	4.465	4.525	4.525	4.525	4.525	4.525	4.525
Furnace Coke, spot, Connellsville, Pa.	$14.75	$14.75	$14.75	$14.75	$14.75	$14.75	$14.75	$14.75	$14.75	$14.75	$14.75	$14.75
Foundry Coke, spot, Connellsville, Pa.	17.00	17.00	17.00	16.875	16.75	16.75	16.75	16.75	16.75	16.75	16.75	16.75
Scrap, No. 1 Heavy Melting Steel	44.00	44.00	44.00	43.75	39.50	41.30	44.50	45.00	39.70	36.00	36.50	33.10
Scrap, Low Phos. (Punchings and Plate)	47.50	47.50	49.80	49.50	48.25	48.10	49.25	49.25	44.50	38.50	40.50	36.10
Scrap, No. 1 Cast, f.o.b. shipping point	46.63	47.00	47.60	45.50	39.75	41.10	43.00	43.25	40.70	39.50	38.50	37.50

* Delivered, consumer's plant.

CHICAGO	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.
Bars, Steel	3.95	3.95	3.95	3.95	3.95	4.07	4.15	4.15	4.15	4.15	4.15	4.15
Plates	3.90	3.90	3.90	3.90	3.90	4.02	4.10	4.10	4.10	4.10	4.10	4.10
Structural Shapes	3.85	3.85	3.85	3.85	3.85	4.00	4.10	4.10	4.10	4.10	4.10	4.10
Bars, Rail Steel	4.844	4.75	4.75	4.75	4.75	4.70	4.625	4.625	4.625	4.625	4.625	4.625
Sheets, Cold-Rolled	4.575	4.575	4.575	4.575	4.575	4.695	4.775	4.775	4.775	4.775	4.775	4.775
Pig Iron, No. 2 Foundry	$55.00	$55.00	$55.00	$55.00	$55.00	$55.00	$56.50	$56.50	$56.50	$56.50	$56.50	$56.50
Pig Iron, Malleable	55.00	55.00	55.00	55.00	55.00	55.00	56.50	56.50	56.50	56.50	56.50	56.50
Scrap, No. 1 Heavy Melting Steel	42.50	42.50	42.50	41.38	36.50	38.30	42.00	42.00	34.70	30.75	33.50	32.20
Scrap Rails for Rerolling	52.50	52.50	55.00	52.50	47.88	48.30	54.63	56.00	51.60	42.75	45.75	46.00
Scrap, No. 1 Cupola Cast, f.o.b. shipping point	43.00	43.00	43.80	42.88	40.38	38.80	41.00	41.75	35.10	32.50	34.25	33.70

* Delivered consumer's plant.

EASTERN PENNSYLVANIA	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.
Plates, Sparrows Point, Md.	3.90	3.90	3.90	3.90	3.90	4.02	4.10	4.10	4.10	4.10	4.10	4.10
Structural Shapes, del. Philadelphia	4.13	4.13	4.13	4.13	4.13	4.28	4.38	4.38	4.38	4.38	4.38	4.38
Steel Bars, del. Philadelphia	4.502	4.502	4.502	4.502	4.502	4.982	5.302	5.302	5.302	5.302	5.302	5.302
Sheets, Hot-Rolled, Sparrows Point, Md.	3.775	3.775	3.775	3.775	3.775	3.865	3.925	3.925	3.925	3.925	3.925	3.925
Pig Iron, Basic, del. Philadelphia	$59.25	$59.25	$59.25	$59.25	$59.25	$59.25	$60.75	$60.75	$60.75	$60.75	$60.75	$60.75
Pig Iron, No. 2 Foundry, del. Philadelphia	59.75	59.75	59.75	59.75	59.75	59.75	61.25	61.25	61.25	61.25	61.25	61.25
Pig Iron, Standard Low Phos, del. Philadelphia	66.05	66.05	66.05	66.05	66.05	66.05	67.55	67.55	67.55	67.55	67.55	67.55
Scrap, No. 1 Heavy Melting Steel	42.50	42.50	45.60	43.50	41.50	41.90	44.06	43.19	36.40	31.50	35.00	32.60
Scrap, No. 1 Cupola, f.o.b. shipping point	45.50	44.63	43.80	41.50	39.25	38.90	38.50	38.25	36.40	35.50	35.50	35.50
Spiegeleisen, 19-21%, Palmerton, Pa., furnace	85.00	85.00	85.00	85.00	85.00	85.00	85.00	86.00	86.00	86.00	86.00	86.00

* Delivered consumer's plant.

COAL CHEMICALS	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.
Benzol, per gallon, producers' plants, tank lots	32.50	32.50	36.00	36.00	36.00	36.00	36.00	36.00	36.00	40.00	40.00	40.00
Toluol, one degree, per gallon, producers' plants	31.50	31.50	31.50	31.50	31.50	31.50	31.50	31.50	31.50	31.50	31.50	31.50
Xylol, per gallon, producers' plants, tank lots	31.75	31.75	31.75	31.75	31.75	31.75	31.75	31.75	31.75	31.75	31.75	31.75
Phenol, 40, per pound, producers' plants, carlots	19.00	19.00	19.00	19.00	19.00	19.00	19.00	19.00	19.00	19.00	19.00	19.00
Sulphate of Ammonia, per ton, bulk, ovens	44.50	44.50	44.50	44.50	44.50	44.50	44.50	44.50	44.50	44.50	44.50	44.50

Nonferrous Prices

METALWORKING FACTS AND FIGURES

NONFERROUS METAL PRICES

(Cents per pound)

	1953												Yearly Averages		
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.*	1953*	1952	1951
Copper Sheets[1]	45.52	45.52	48.98	50.48	50.48	50.48	50.48	50.48	48.38	48.38	48.38	48.38	48.83	43.60	41.04
Copper Rods[2]	42.62	42.62	46.58	48.08	48.08	48.08	48.08	48.08	45.98	45.98	45.98	45.98	46.01	39.45	36.89
Copper Tubing[1]	45.56	45.56	48.92	50.42	50.42	50.42	50.42	50.42	48.44	48.44	48.44	48.44	48.83	43.64	41.08
Yellow Brass Sheets[1]	40.17	40.64	42.03	42.87	42.87	42.87	42.87	42.87	41.72	41.72	41.72	41.72	42.01	39.23	37.85
Yellow Brass Rods[1]	33.85	33.85	35.92	36.68	36.68	36.68	36.68	36.68	41.66	41.66	41.66	41.66	37.81	33.24	32.23
Yellow Brass Tubing[1]	43.18	43.64	44.94	45.78	45.78	45.78	45.78	45.78	44.63	44.63	44.63	44.63	44.93	42.24	40.86
Nickel Silver Sheets[3]	51.96	51.96	55.16	56.56	56.56	56.56	56.56	56.56	55.36	55.36	55.36	55.36	55.28	54.11	52.04
Phosphor Bronze Sheets[4]	64.71	64.71	68.57	70.50	70.50	70.50	70.50	70.50	66.58	66.58	66.58	66.58	68.07	62.89	60.44
Zinc Sheets[1]	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	24.74	24.90
Bronze Sheets[2]	44.38	44.38	47.46	48.76	48.76	48.76	48.76	48.76	46.95	46.95	46.95	46.95	47.32	42.76	40.55
Bronze Rods[2]	44.07	44.07	47.15	48.45	48.45	48.45	48.45	48.45	46.89	46.89	46.89	46.89	47.09	42.50	40.24
Bronze Tubing[2]	47.04	47.04	50.02	51.32	51.32	51.32	51.32	51.32	49.51	49.51	49.51	49.51	49.90	45.42	43.22
Yellow Brass Wire[1]	40.46	40.93	42.32	43.16	43.16	43.16	43.16	43.16	42.26	42.26	42.26	42.26	42.38	39.52	38.14
Copper Magnet Wire[5]	38.75	39.53	42.42	43.93	43.93	43.93	42.53	41.83	41.83	41.83	41.83	41.83	42.01	36.63	34.50
Weatherproof Copper Wire[6]	33.85	34.29	37.00	38.10	38.10	38.10	37.05	36.53	36.53	36.53	36.53	36.53	36.60	32.23	30.11
Bare Copper Wire[6]	32.92	34.26	36.17	37.58	37.58	37.58	36.18	35.48	35.48	35.48	35.48	35.48	35.81	30.80	29.53
No. 115 Brass Ingot[7]	27.25	27.81	29.50	27.63	26.00	26.00	25.63	24.50	24.50	24.50	24.50	24.50	26.03	27.25	27.25
No. 305 Brass Ingot[7]	33.00	33.50	35.00	32.25	30.00	30.00	29.69	28.75	28.75	28.75	28.75	28.75	30.60	32.95	32.25
No. 405 Brass Ingot[7]	23.25	23.44	24.00	22.64	21.25	21.25	21.13	20.75	20.75	20.75	20.75	20.75	21.73	23.25	23.25

[1]F.o.b. mill. [2]90% Cu; f.o.b. mill. [3]18% Ni; f.o.b. mill. [4]Grade A; f.o.b. mill. [5]Carlots; f.o.b. destination. [6]Carlots; f.o.b. eastern mill. [7]Delivered. [8]Cold-drawn, f.o.b. mill.

COPPER

Electrolytic; cents per lb, delivered Connecticut Valley

	1953	1952	1951	Yearly Averages
Jan.	24.500	24.500	24.500	1953* 29.037
Feb.	25.136	24.500	24.500	1952 24.500
Mar.	30.510	24.500	24.500	1951 24.500
Apr.	30.755	24.500	24.500	1950 21.588
May	28.845	24.500	24.500	1949 19.499
June	29.875	24.500	24.500	1948 22.317
July	29.846	24.500	24.500	1947 21.215
Aug.	29.375	24.500	24.500	1946 14.043
Sept.	29.500	24.500	24.500	1945 12.000
Oct.	29.606	24.500	24.500	1944 12.000
Nov.	29.750	24.500	24.500	1943 12.000
Dec.	29.750*	24.500	24.500	1942 12.000

ZINC

Prime Western; cents per lb, East St. Louis

	1953	1952	1951	Yearly Averages
Jan.	12.596	19.500	17.500	1953* 10.851
Feb.	11.431	19.500	17.500	1952 16.213
Mar.	11.000	19.500	17.500	1951 17.994
Apr.	11.000	19.500	17.500	1950 13.879
May	11.000	19.500	17.500	1949 12.152
June	11.000	15.740	17.500	1948 13.563
July	11.000	15.000	17.500	1947 10.500
Aug.	11.000	14.067	17.500	1946 8.727
Sept.	10.180	13.990	17.500	1945 8.250
Oct.	10.000	13.250	19.426	1944 8.250
Nov.	10.000	12.500	19.500	1943 8.250
Dec.	10.000*	12.500	19.500	1942 8.250

CADMIUM

Regular shapes; dollars per lb, del.

	1953	1952	1951	1950	1949	1948
Jan.	1.94	2.55	2.55	2.00	2.00	1.75
Feb.	2.00	2.55	2.55	2.00	2.00	1.75
Mar.	2.00	2.55	2.55	2.00	2.00	1.75
Apr.	2.00	2.55	2.55	2.00	2.00	1.75
May	2.00	2.40	2.55	2.00	2.00	1.75
June	2.00	2.25	2.55	2.11	2.00	1.75
July	2.00	2.20	2.55	2.15	2.00	1.75
Aug.	2.00	2.00	2.55	2.15	2.00	1.90
Sept.	2.00	2.00	2.55	2.34	2.00	1.90
Oct.	2.00	2.00	2.55	2.40	2.00	1.90
Nov.	2.00	2.00	2.55	2.44	2.00	1.94
Dec.	2.00*	1.80	2.55	2.55	2.00	2.00
Av.	1.99	2.24	2.55	2.18	2.00	1.82

ANTIMONY

Domestic, bulk, carlots; cents per lb, f.o.b. Laredo, Tex.

	1953	1952	1951	Yearly Averages
Jan.	34.500	50.000	35.462	1953* 33.932
Feb.	34.500	50.000	42.000	1952 42.112
Mar.	34.500	50.000	42.000	1951 42.335
Apr.	34.500	49.077	42.000	1950 27.626
May	34.500	42.077	42.000	1949 36.875
June	34.500	39.000	42.000	1948 35.010
July	34.500	39.000	42.000	1947 31.922
Aug.	34.500	39.000	42.000	1946 15.972
Sept.	34.500	39.000	42.000	1945 14.500
Oct.	34.500	39.000	42.000	1944 14.500
Nov.	33.682	34.688	44.500	1943 14.500
Dec.	28.500	34.500	50.000	1942 14.417

* Estimated.

ALUMINUM

99% plus, ingots; cents per lb, f.o.b. shipping point

	1953	1952	1951	Yearly Averages
Jan.	20.173	19.000	19.000	1953* 20.925
Feb.	20.500	19.000	19.000	1952 19.410
Mar.	20.500	19.000	19.000	1951 19.000
Apr.	20.500	19.000	19.000	1950 17.695
May	20.500	19.000	19.000	1949 17.000
June	20.500	19.000	19.000	1948 15.764
July	20.923	19.000	19.000	1947 15.000
Aug.	21.500	19.923	19.000	1946 15.000
Sept.	21.500	20.000	19.000	1945 15.000
Oct.	21.500	20.000	19.000	1944 15.000
Nov.	21.500	20.000	19.000	1943 15.000
Dec.	21.500*	20.000	19.000	1942 15.000

LEAD

Common grade; cents per lb, St. Louis

	1953	1952	1951	Yearly Averages
Jan.	13.838	18.800	16.800	1953* 13.283
Feb.	13.300	18.800	16.800	1952 16.268
Mar.	13.300	18.800	16.800	1951 17.294
Apr.	12.473	18.723	16.800	1950 13.095
May	12.550	15.519	16.800	1949 15.191
June	13.213	15.060	16.800	1948 17.867
July	13.483	15.800	16.800	1947 14.564
Aug.	13.800	15.800	16.800	1946 7.957
Sept.	13.540	15.800	16.800	1945 6.350
Oct.	13.300	14.226	18.726	1944 6.356
Nov.	13.300	13.965	18.800	1943 6.350
Dec.	13.300*	13.925	18.800	1942 6.331

COBALT

97-98%; dollars per lb for 500 lb keg

	1953	1952	1951	1950	1949	1948
Jan.	2.40	2.40	2.10	1.80	1.65	1.65
Feb.	2.40	2.40	2.10	1.80	1.65	1.65
Mar.	2.40	2.40	2.10	1.80	1.65	1.65
Apr.	2.40	2.40	2.10	1.80	1.80	1.65
May	2.40	2.40	2.10	1.80	1.80	1.65
June	2.40	2.40	2.10	1.80	1.80	1.65
July	2.40	2.40	2.10	1.80	1.80	1.65
Aug.	2.40	2.40	2.10	1.80	1.80	1.65
Sept.	2.40	2.40	2.10	1.80	1.80	1.65
Oct.	2.40	2.40	2.40	1.80	1.80	1.65
Nov.	2.60	2.40	2.40	1.80	1.80	1.65
Dec.	2.60*	2.40	2.40	2.025	1.80	1.65
Av.	2.43*	2.40	2.18	1.82	1.76	1.65

SILVER

Open market, cents per fine oz., New York

	1953	1952	1951	Yearly Averages
Jan.	84.442	88.000	88.500	1953* 85.183
Feb.	85.250	88.000	90.160	1952 84.937
Mar.	85.250	88.000	90.160	1951 89.385
Apr.	85.250	88.000	90.160	1950 74.165
May	85.250	85.356	90.160	1949 71.930
June	85.250	82.750	88.492	1948 74.361
July	85.250	82.885	90.166	1947 71.820
Aug.	85.250	83.250	90.160	1946 80.151
Sept.	85.250	83.250	90.160	1945 71.528
Oct.	85.250	83.250	88.120	1944 44.750
Nov.	85.250	83.250	88.000	1943 44.750
Dec.	85.250*	83.250	88.000	1942 38.333

† As reported by Handy & Harman, New York.

NICKEL

Electrolytic Cathodes, 99.5% base sizes, unpacked, cents per lb, f.o.b. refinery

	1953	1952	1951	Yearly Averages
Jan.	58.654	56.500	56.500	1953* 56.888
Feb.	60.000	56.500	56.500	1952 56.500
Mar.	60.000	56.500	56.500	1951 54.000
Apr.	60.000	56.500	56.500	1950 44.800
May	60.000	56.500	56.500	1949 40.000
June	60.000	56.500	56.500	1948 36.528
July	60.000	56.500	56.500	1947 35.000
Aug.	60.000	56.500	56.500	1946 31.856
Sept.	60.000	56.500	56.500	1945 35.000
Oct.	60.000	56.500	56.500	1944 35.000
Nov.	60.000	56.500	56.500	1943 35.000
Dec.	60.000*	56.500	56.500	1942 35.000

TIN

Straits, spot; cents per lb, New York

	1953	1952	1951	Yearly Averages
Jan.	121.500	109.404	171.798	1953* 85.020
Feb.	121.500	121.500	182.716	1952 120.492
Mar.	121.500	121.500	145.730	1951 127.072
Apr.	102.767	121.500	145.735	1950 95.552
May	97.240	121.500	139.923	1949 99.906
June	92.918	121.500	117.962	1948 99.256
July	81.577	121.500	106.000	1947 77.975
Aug.	80.530	121.500	103.000	1946 54.563
Sept.	82.410	121.500	103.000	1945 52.000
Oct.	81.096	121.500	103.000	1944 52.000
Nov.	83.352	121.500	103.000	1943 52.000
Dec.	82.750*	121.500	103.000	1942 52.000

IRIDIUM

Dollars per troy ounce

	1953	1952	1951	1950	1949
Jan.	180.00	200.00	200.00	105.00	112.50
Feb.	180.00	200.00	200.00	100.00	107.50
Mar.	180.00	200.00	200.00	100.00	105.00
Apr.	177.50	200.00	200.00	100.00	105.00
May	170.00	200.00	200.00	100.00	105.00
June	170.00	200.00	200.00	100.00	105.00
July	170.00	200.00	200.00	145.00	105.00
Aug.	170.00	200.00	200.00	176.00	105.00
Sept.	170.00	200.00	200.00	220.00	105.00
Oct.	170.00	200.00	200.00	212.00	105.00
Nov.	170.00	185.00	200.00	200.00	105.00
Dec.	170.00*	180.00	200.00	200.00	105.00
Av.	173.13*	197.08	200.00	146.50	105.83

PLATINUM

Dollars per ounce

	1953	1952	1951	1950	1949	1948
Jan.	91.50	91.50	91.50	69.50	90.00	67.50
Feb.	91.50	91.50	91.50	67.50	86.75	70.50
Mar.	91.50	91.50	91.50	67.50	77.30	73.50
Apr.	91.50	91.50	91.50	67.50	73.50	94.70
May	91.50	100.50	91.50	67.50	73.50	99.50
June	91.50	94.50	91.50	67.50	71.70	85.50
July	93.00	91.50	91.50	73.50	70.50	87.90
Aug.	92.00	91.50	91.50	78.80	70.50	94.50
Sept.	92.00	91.50	91.50	98.25	70.50	94.50
Oct.	92.00	91.50	91.50	97.50	70.50	94.50
Nov.	92.00	91.50	91.50	91.50	70.50	94.50
Dec.	92.00*	91.50	91.50	91.50	70.50	93.50
Av.	91.83*	92.50	91.50	78.146	74.65	87.55

* Estimated.

COPPER PRODUCTION, SHIPMENTS AND STOCKS

DOMESTIC STATISTICS—Net Tons

Period	PRODUCTION Primary	Secondary	Refined	Deliveries To Customers	Refined Stocks End of Period
1953					
10 mos.	799,357	93,866	1,152,477	1,230,567(b)	84,303(a)
Jan.	78,124	3,501	108,010	125,133(b)	59,836(a)
Feb.	75,172	8,481	101,538	117,204(b)	60,944(a)
Mar.	82,221	19,604	112,016	133,462(b)	55,807(a)
Apr.	81,739	14,151	113,782	142,382(b)	48,382(a)
May	84,091	9,106	117,929	146,215(b)	52,762(a)
June	75,838	9,110	127,294	139,300(b)	58,126(a)
July	79,938	8,125	122,036	104,481(b)	77,100(a)
Aug.	79,376	5,577	108,974	106,985(b)	78,825(a)
Sept.	78,952	7,796	114,760	104,886(b)	72,907(a)
Oct.	83,906	8,415	126,138	110,519(b)	84,303(a)
1952	961,886	46,003	1,189,112	1,445,834(b)	58,858(a)
1951	964,589	56,910	1,199,784	1,367,787	71,528
1950	940,249	117,439	1,270,768	1,371,464	49,040
1949	772,968	135,052	1,056,463	1,031,595	116,027
1948	850,088	130,410	1,233,697	1,344,445	96,080
1947	871,391	105,307	1,196,393	1,383,666	76,035
1946	618,757	32,503	804,071	1,260,921	80,832
1945	792,126	49,541	843,113	1,517,842	76,512
1944	995,938	60,242	1,098,788	1,636,295	66,780
1943	1,111,022	83,677	1,206,871	1,643,677	52,121

FOREIGN STATISTICS—Net Tons

Period	PRODUCTION Primary	Secondary	Refined	Deliveries To Customers	Refined Stocks End of Period
1953					
10 mos.	1,220,993	11,789	942,430	664,374	258,681
Jan.	121,162	2,199	93,667	81,417	120,629
Feb.	118,589	1,240	88,539	65,195	122,223
Mar.	120,013	613	102,126	71,422	130,465
Apr.	127,582	1,034	104,025	64,337	146,974
May	118,721	1,047	97,235	61,682	147,234
June	132,522	717	106,931	77,232	164,836
July	128,411	427	93,847	77,802	166,430
Aug.	123,550	996	92,565	46,133	209,220
Sept.	116,134	1,435	70,843	48,896	236,336
Oct.	114,309	2,081	92,632	70,258	258,681
1952	1,401,001	9,582	1,196,426	1,005,329	130,103
1951	1,378,833	5,360	1,225,018	1,013,450	152,203
1950	1,347,356	11,387	1,127,329	898,601	139,919
1949	1,270,529	10,241	1,076,114	933,641	147,972
1953	**Total Domestic and Foreign**				
10 mos.	2,020,350	105,655	2,094,907	1,894,941	342,984
1952	2,362,887	55,585	2,385,538	2,451,093	188,961
1951	2,343,422	62,270	2,424,802	2,381,237	223,731
1950	2,287,605	128,826	2,398,097	2,270,065	188,959
1949	2,043,515	145,293	2,132,577	1,965,236	263,999

Copper Institute. Includes tonnage delivered: (a) to U. S. consumers at foreign ports; (b) from government stocks.

Imports of Copper

Unrefined, Scrap, Refined—Net Tons

	1953	1952	1951	1950	1949	1948
Jan.	50,055	49,580	45,886	56,213	48,329	30,435
Feb.	62,360	41,941	44,872	61,378	59,160	46,638
Mar.	52,397	48,272	36,609	45,207	64,374	46,981
Apr.	71,110	42,970	43,812	34,520	48,405	37,727
May	67,098	37,172	46,771	66,117	46,548	33,271
June	81,341	33,061	50,544	87,293	46,570	46,840
July	66,200	66,380	46,606	28,681	33,829	46,684
Aug.	50,782	61,122	58,969	33,576	45,372	39,736
Sept.	58,652	67,817	46,566	36,298	38,176	35,423
Oct.		59,910	42,943	62,645	37,231	36,947
Nov.		59,230	39,714	39,172	41,786	35,491
Dec.		70,300	36,021	54,807	59,054	52,222
Monthly Avg.		53,146	44,942	50,492	47,403	40,698

U. S. Bureau of the Census

Exports of Copper

Refined and Manufactured—Net Tons

	1953	1952	1951	1950	1949	1948
Jan.	8,079	10,598	8,729	12,165	21,041	18,013
Feb.	6,030	12,842	16,027	20,748	10,653	18,297
Mar.	8,645	15,303	14,457	19,021	15,415	15,043
Apr.	6,551	19,494	17,652	17,120	11,248	23,272
May	8,669	20,252	14,041	14,064	14,910	19,861
June	7,278	18,347	13,162	11,434	17,066	21,079
July	13,317	15,435	13,535	9,785	10,349	15,069
Aug.	18,848	14,604	6,714	12,230	8,695	20,623
Sept.		20,945	4,971	12,035	14,214	12,085
Oct.		18,226	9,864	11,925	9,388	18,316
Nov.		13,016	16,488	12,226	13,075	11,636
Dec.		16,257	16,599	20,905	25,049	13,725
Monthly Avg.		16,277	12,687	14,472	14,259	17,252

U. S. Bureau of the Census

Brass Ingot Shipments

Net Tons

	1953	1952	1951	1950
Jan.	24,423	28,315	28,416	18,874
Feb.	25,429	24,211	27,168	18,487
Mar.	28,256	23,890	31,997	22,494
Apr.	25,044	22,547	30,472	22,118
May	21,660	21,740	33,267	23,643
June	20,818	21,274	33,817	25,093
July	19,321	18,947	32,016	21,609
Aug.	20,156	21,807	25,285	29,689
Sept.	21,463	22,770	22,285	28,811
Oct.		25,811	23,121	32,240
Nov.		23,441	23,544	31,748
Dec.		22,983	20,987	28,757
Total		277,736	332,378	303,563

Compiled by Ingot Brass & Bronze Industry, representing in excess of 95 per cent of brass and bronze industry.

Copper Consumption in U.S.

Refined Metal—Net Tons

	1952†	1951	1950
Brass Mills	670,141	650,967	675,100
Wire Mills	740,683	710,199	713,354
Chemical Plants	3,300	3,223	3,122
Secondary Smelters	16,644	13,744	6,209
Foundries & Misc.	26,700	38,732	26,649
Total	1,457,468	1,416,865	1,424,434

† Preliminary. U. S. Bureau of Mines

Copper and Brass Mill Fabricator Statistics

(Summary of statistics which cover United States duty-free copper until Mar. 1, 1941; duty-paid foreign copper included thereafter; beginning January, 1947, copper from all sources, duty free. Figures given in net tons.)

End of period:	DELIVERIES: Deliveries to Users (actual consump)	Producer Deliveries to Fabricators	STOCKS: Fabricators' Refined Stocks	Less Working Stocks	Visible Supplies	Plus Undelivered Purchases	Total Stocks and Purchases	Unfilled Orders
1953								
10 Mos.	1,189,959	1,229,567	352,091	305,431	46,660	31,035	77,695	187,438
Jan.	134,203	125,133	321,212	294,467	26,745	43,195	69,940	275,736
Feb.	123,850	117,204	312,177	290,367	21,810	52,590	74,800	296,760
Mar.	122,980	133,462	319,356	292,447	26,909	47,685	74,594	291,979
Apr.	116,419	142,382	342,771	295,096	47,675	53,501	101,176	298,532
May	126,972	146,215	364,197	293,794	70,403	49,952	120,355	285,425
June	132,395	139,300	363,020	297,387	65,633	40,759	106,392	268,099
July	91,826	104,481	375,629	302,113	73,516	39,936	113,452	259,641
Aug.	113,250	105,985	366,244	305,204	61,040	42,490	103,530	235,893
Sept.	111,805	104,886	358,081	307,612	50,469	38,593	89,062	206,476
Oct.	116,259	110,519	352,091	305,431	46,660	31,035	77,695	187,438
1952	1,391,477	1,445,834	331,499	292,157	39,342	32,652	71,994	275,608
Jan.	131,988	130,430	267,427	294,202	26,775	36,239	9,464	292,932
Feb.	115,150	104,795	258,279	291,475	33,196	42,911	9,715	292,069
Mar.	116,887	112,625	254,868	292,932	38,064	34,085	3,979	309,855
Apr.	106,109	107,355	256,798	288,673	31,875	39,834	7,959	318,198
May	110,388	105,860	240,962	289,822	48,860	41,135	7,725	304,639
June	107,709	98,416	245,750	286,576	40,826	39,513	1,313	299,144
July	83,012	115,384	281,064	293,220	12,156	53,716	41,560	303,765
Aug.	120,084	127,910	298,849	287,512	11,337	50,399	61,736	294,280
Sept.	123,740	135,486	308,036	295,275	12,761	47,188	59,949	285,465
Oct.	127,120	138,759	311,676	290,634	21,042	45,970	67,012	285,114
Nov.	130,027	125,338	315,612	292,028	23,584	33,710	57,294	279,776
Dec.	119,263	143,088	331,499	292,157	39,342	32,652	71,994	275,608
1951	1,394,960	1,367,787	280,402	295,385	14,983	32,147	17,164	303,050
1950	1,438,237	1,371,464	290,241	288,392	1,849	92,372	94,221	313,052
1949	1,053,225	1,031,595	354,992	285,298	69,694	82,793	152,487	189,407
1948	1,394,307	1,344,445	379,346	295,958	83,388	81,496	164,884	315,944
1947	1,338,383	1,383,666	423,432	293,859	129,573	103,765	233,338	338,260
1946	1,231,225	1,260,921	411,013	286,418	124,595	59,421	184,016	526,648
1945	1,462,440	1,517,842	375,618	268,490	107,128	44,100	151,228	362,436
1944	1,656,052	1,636,295	334,017	289,160	44,857	53,538	98,395	285,654
1943	1,701,753	1,643,955	353,948	299,796	54,152	90,807	144,959	465,258
1942	1,517,983	1,635,236	414,668	340,547	74,121	135,481	209,602	613,005
1941	1,577,765	1,545,541	295,813	291,515	4,298	241,335	245,633	547,468
1939	793,399	814,407	300,543	184,833	115,710	189,687	305,397	237,752

Slab Zinc

Net Tons

(Commencing with January, 1948, all regularly operating United States primary and secondary smelters are included. Production from foreign ores is included commencing with 1940.)

	Stock Beginning	Production	SHIPMENTS Domestic	Export & Drawback	Gov't. Acc't.	Total	Unfilled Orders at End
1953*	87,160	977,000	828,000	13,000	42,000	883,000	30,000
Jan.	87,160	81,994	77,573	2,205	901	80,679	39,732
Feb.	88,475	76,899	67,729	1,997	1,981	71,710	37,172
Mar.	93,664	83,485	72,388	1,315	3,582	77,285	54,524
Apr.	99,864	80,459	78,211	215	7,617	86,043	38,722
May	94,280	82,422	75,648	259	8,343	84,250	43,271
June	92,452	81,617	72,612	36	4,136	76,784	44,307
July	97,285	80,825	69,498	94	4,612	74,204	32,327
Aug.	103,906	83,241	65,450	428	3,372	69,250	32,988
Sept.	117,897	81,211	55,167	165	2,215	57,547	27,323
Oct.	141,561	84,031	65,470	482	1,223	67,175	25,950
Nov.	158,417	75,830	63,616	2,848	2,220	68,684	29,437
1952	87,160	961,430	803,343	56,202	36,626	896,171	45,264
1951	8,884	931,833	836,800	42,067	39,949	918,816	50,909
1950	94,221	910,363	849,255	18,189	128,256	995,700	74,795
1949	20,848	870,113	648,285	56,928	91,526	796,740	42,625
1948	68,647	850,105	770,396	69,910	57,598	898,154	51,318
1947	175,806	841,027	698,281	117,305	140,230	955,816	59,705
1946	259,391	759,346	714,292	66,638	62,007	842,937	58,057
1945	237,520	799,520	762,925	9,422	5,302	777,649	27,092
1944	173,510	901,332	830,334	6,988	.....	837,322	21,332
1943	89,275	971,873	831,430	56,208	.....	887,638	44,914
1942	24,066	929,770	733,918	151,650	.....	885,568	52,752
1941	17,582	863,955	751,276	106,195	.....	857,471	87,666
1940	74,262	706,100	674,615	88,165	.....	762,780	125,132
1939	126,769	538,198	598,972	.....	.....	598,972	53,751
1938	65,333	456,990	395,534	20	.....	395,554	40,829
1937	44,955	589,619	569,241	.....	.....	569,241	48,339
1936	83,758	523,166	561,969	.....	.....	561,969	78,626
1935	118,005	431,499	465,687	59	.....	465,746	51,186
1934	105,560	366,933	352,515	148	.....	352,663	30,786
1933	124,856	324,765	343,762	239	.....	344,001	15,978
1932	129,842	213,531	218,347	170	.....	218,517	8,478

American Zinc Institute Inc. * Estimated

U. S. Lead

Refiners' Stocks, Production, Shipments

Net Tons

	Stock at Beginning	Production (Inc. Secondary)	Total Supply	Domestic Shipments
1953*	43,560	508,000	551,560	485,000
Jan.	43,560	47,295	90,855	35,529
Feb.	52,760	45,423	98,183	36,811
Mar.	58,949	47,993	106,942	42,242
Apr.	62,371	46,729	109,100	39,487
May	69,608	43,187	112,795	48,914
June	63,879	36,880	100,759	44,140
July	56,569	40,210	96,779	35,652
Aug.	61,017	38,022	99,039	40,836
Sept.	58,103	42,154	100,257	41,598
Oct.	58,490	44,741	103,231	44,987
1952	25,339	532,778	558,117	492,094
1951	35,619	486,874	522,493	496,184
1950	70,424	571,763	642,187	499,637
1949	38,644	542,676	581,320	355,905
1948	21,328	511,356	532,684	490,630
1947	47,587	541,065	588,652	566,666
1946	44,867	396,688	441,555	393,904
1945	19,536	524,328	543,864	500,003
1944	33,090	538,618	571,708	552,063
1943	34,937	546,673	581,610	548,417
1942	20,185	633,818	654,003	618,947
1941	40,926	634,888	675,814	655,542
1940	58,777	685,480	644,257	603,143
1939	115,902	497,991	613,893	555,074
1938	129,131	408,539	537,570	421,625
1937	171,856	533,215	705,071	575,933
1936	222,306	463,006	685,312	513,361
1935	234,030	421,764	655,794	433,456
1934	203,061	412,298	615,359	379,807
1933	176,157	374,153	550,310	347,156
1932	151,653	342,137	493,790	317,261

American Bureau of Metal Statistics * Estimated

Mine Production of Zinc

Net Tons

	1953	1952	1951	1950	1949
Jan.	54,035	59,323	59,651	43,606	51,656
Feb.	49,506	58,948	56,878	46,030	52,963
Mar.	51,803	60,904	60,670	51,692	62,049
Apr.	51,333	61,211	56,467	49,183	59,185
May	47,940	62,663	58,233	52,111	55,925
June	46,413	57,068	56,473	50,625	54,271
July	42,252	50,642	53,379	48,423	40,256
Aug.	41,034	49,482	54,403	56,221	45,068
Sept.	.....	48,748	50,089	54,794	41,887
Oct.	.....	53,346	60,004	55,791	38,823
Nov.	.....	48,899	57,195	54,604	40,112
Dec.	.....	49,789	57,269	55,127	41,687
Mo. Avg.	.....	55,085	55,960	51,517	48,657

U. S. Bureau of Mines

Mine Production of Lead

Net Tons

	1953	1952	1951	1950	1949
Jan.	30,660	34,299	35,481	35,640	33,010
Feb.	29,458	34,339	33,870	34,925	32,562
Mar.	30,715	33,432	37,096	39,056	39,714
Apr.	31,137	34,496	33,587	35,558	36,979
May	28,905	33,824	34,005	38,024	36,731
June	28,129	31,002	32,681	36,957	36,069
July	26,444	29,862	30,491	31,398	29,778
Aug.	26,164	30,232	29,872	36,030	33,852
Sept.	26,177	30,386	27,653	35,104	30,549
Oct.	.....	33,523	33,133	35,731	29,734
Nov.	.....	29,160	33,326	35,377	31,186
Dec.	.....	29,542	33,499	36,175	33,868
Mo. Avg.	.....	32,008	32,347	35,902	34,159

U. S. Bureau of Mines

Standard Specifications for Slab Zinc

Maximum Per Cent

Grade	Pb	Fe	Cd	Sum of Pb, Fe, Cd
Special High Grade*	0.006	0.005	0.004	0.01
High Grade*	0.07	0.02	0.07	0.10
Intermediate*	0.20	0.03	0.50	0.50
Brass Special*	0.60	0.03	0.50	1.00
Select*	0.80	0.04	0.75	1.25
Prime Western	1.60	0.08	.....	.....

*No aluminum allowed

CONSUMPTION OF SLAB ZINC IN U.S.

Net Tons

	Galvanizing	Brass & Bronze Products	Rolled Zinc	Zinc-Base Alloys	Miscellaneous	Total
1953						
Jan.	36,974	16,739	4,593	27,465	3,332	89,103
Feb.	34,882	14,880	3,914	27,092	3,330	84,098
Mar.	37,375	17,494	5,360	30,651	3,672	94,452
Apr.	36,181	17,162	5,109	29,790	3,302	91,544
May	34,790	17,748	5,082	27,398	3,408	88,426
June	32,758	17,564	5,309	27,099	3,129	85,859
July	30,535	12,361	4,053	22,832	3,250	73,031
1952	375,563	155,311	51,508	236,022	30,885	849,289
1951	400,279	143,292	64,085	296,434	29,881	933,971
1950	441,686	139,373	68,444	289,527	28,104	967,134
1949	350,880	85,534	55,200	202,181	18,046	711,841
1948	370,969	109,140	76,672	234,628	26,326	817,735
1947	361,327	112,347	70,680	214,469	27,537	786,360

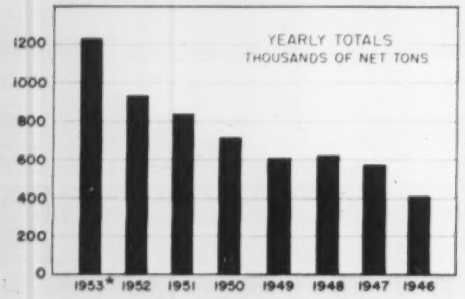
CONSUMPTION OF LEAD IN U.S.—1952-53

Net Tons

Metal Products	Total 1952	1953 Jan.	Feb.	Mar.	Apr.	May	June	July
Ammunition	30,072	2,703	3,008	3,551	4,162	3,870	4,159	3,754
Bearing Metals	36,085	3,350	3,155	3,504	3,468	3,238	2,683	2,960
Brass & Bronze	22,845	2,322	2,248	2,393	2,215	2,188	2,146	1,745
Cable Covering	142,611	12,348	11,556	13,162	13,465	12,692	12,950	7,876
Calking Lead	44,809	3,673	3,320	4,198	3,862	3,826	4,165	4,519
Casting Metals	20,419	1,370	724	1,243	1,157	1,104	1,245	941
Collapsible Tubes	9,933	823	913	1,236	1,077	839	878	840
Foil	2,124	232	224	255	343	542	486	416
Pipes, Traps & Bends	29,098	2,353	2,140	2,705	2,420	2,159	2,563	2,744
Sheet Lead	28,632	2,240	2,829	2,865	2,553	2,477	2,705	2,896
Solder	72,351	6,689	6,630	6,898	7,729	6,541	6,956	7,246
Storage Batteries								
Antimonial Lead	187,462	14,664	13,377	14,509	15,609	16,878	16,757	16,761
Oxides	164,424	12,478	11,703	12,270	13,641	16,900	15,726	14,532
Terne Metal	1,812	226	311	244	260	240	301	310
Type Metal	27,293	2,529	2,074	2,931	2,610	2,191	2,121	1,939
Total Metal Products	819,970	68,000	64,212	71,964	74,571	75,885	75,841	69,479
Pigments	123,083	10,912	10,091	10,930	11,644	10,529	12,174	10,442
Chemicals	150,719	12,635	13,047	15,323	13,256	10,687	15,685	15,128
Miscellaneous Uses	28,375	2,819	2,743	2,906	3,281	2,618	3,054	2,966
Total Consumed	1,122,147	94,366	90,093	101,123	102,852	99,519	106,754	97,715

U. S. Bureau of Mines

PRIMARY ALUMINUM PRODUCTION



1947-1953 By Months—Net Tons

	1953	1952	1951	1950	1949	1948	1947
Jan.	89,595	76,934	67,954	52,023	53,356	48,767	50,045
Feb.	92,649	72,374	62,740	50,443	49,749	45,899	47,002
Mar.	104,460	77,069	70,022	58,747	54,852	51,874	53,082
Apr.	102,071	76,880	67,701	56,024	54,076	53,277	51,007
May	105,477	80,803	67,720	61,929	56,909	55,450	51,116
June	104,152	77,476	67,454	60,400	54,184	48,557	46,259
July	109,285	78,368	72,696	63,518	55,777	52,937	47,996
Aug.	110,545	85,175	73,816	63,006	52,001	54,953	47,054
Sept.	109,333	76,882	69,429	59,449	49,742	53,256	43,228
Oct.	108,219	77,312	72,647	62,915	45,790	54,526	43,959
Nov.	.....	74,639	72,246	62,276	35,865	50,714	43,461
Dec.	.....	83,409	72,454	65,897	41,161	53,474	47,589
Total	1,253,000*	937,321	836,851	718,627	603,462	623,456	571,750

Yearly totals reflect adjustments and in some instances vary slightly from the sums of monthly figures. * Estimated. U. S. Bureau of Mines

Secondary Aluminum Production

Net Tons

	From New Scrap	From Old Scrap	Total	As Metal	As Alloyst
1952	233,258	71,264	304,522	N.A.	N.A.
1951	216,917	76,591	292,608	5,341	287,267
1950	167,308	76,358	243,666	2,140	241,526
1949	136,166	44,596	180,762	343	180,419
1948	191,129	95,648	286,777	2,384	284,393
1947	180,960	163,847	344,837	5,105	339,732
1946	187,538	90,535	278,073	2,075	275,998
1945	271,076	27,311	298,387	2,145	296,242
1944	302,746	22,899	325,645	2,336	323,309
1943	280,867	33,094	313,961	5,926	308,035
1942	154,831	41,633	198,492	14,104	184,388

† Also includes chemical compounds.
U. S. Bureau of Mines. N.A.—Not available

Bauxite Production and Imports

Long Tons. Quarterly figures are preliminary and their sums differ slightly from final annual totals.

	—Mine Production (dried equiv.)— Arkansas	Ala., Ga., Va.	Total	Imports as Shipped	Total New Supply
1953					
1st Qtr.	365,249	14,364	379,613	908,305	1,287,918
2nd Qtr.	397,042	14,834	411,876	1,106,243	1,518,119
3rd Qtr.	376,651	11,211	387,862	1,199,205	1,587,067
1952	1,603,883	63,214	1,667,047	3,497,939	5,164,986
1st Qtr.	411,858	14,411	426,269	848,689	1,274,918
2nd Qtr.	442,656	15,956	458,612	729,952	1,188,564
3rd Qtr.	296,781	15,589	312,370	932,394	1,244,764
4th Qtr.	501,133	17,221	518,354	995,155	1,513,509
1951	1,815,274	33,402	1,848,676	2,829,929	4,678,605
1st Qtr.	372,055	9,477	381,532	686,981	1,068,513
2nd Qtr.	501,536	4,568	506,104	676,547	1,182,651
3rd Qtr.	450,553	6,825	457,378	747,554	1,204,932
4th Qtr.	507,162	11,900	519,062	718,847	1,237,909
1950	1,307,335	27,192	1,334,527	2,508,970	3,843,497
1st Qtr.	N.A.	N.A.	325,025	628,301	953,326
2nd Qtr.	N.A.	N.A.	371,708	651,329	1,023,037
3rd Qtr.	288,220	8,258	296,478	626,074	922,552
4th Qtr.	345,824	7,994	353,828	603,266	957,094
1949	1,094,924	53,868	1,148,792	2,688,164	3,836,956
1948	1,395,341	61,807	1,457,148	2,488,915	3,946,063
1947	1,153,563	48,492	1,202,055	1,821,580	3,023,635
1946	1,019,118	53,707	1,072,825	852,005	1,924,830

† Includes Mississippi. N.A.—Not available. U. S. Bureau of Mines.

Aluminum Wrought Products

Producers' Shipments, Thousands of Pounds

Period	Total	Plate, Sheet, and Strip	Rolled Structural Shapes, Rod, Bar, Wire	Extruded Shapes, Tube Blooms, and Tubing	Powder, Flake, and Paste
1953*	2,367,000	1,407,030	465,016	454,005	40,949
January	187,942	110,744	35,678	37,411	4,109
February	185,692	109,165	36,477	36,119	3,931
March	159,855	85,104	43,267	27,171	4,313
April	219,413	129,195	46,472	40,080	3,666
May	209,050	123,640	41,709	40,003	3,698
June	205,000*	121,309	40,244	40,563	2,884
July	202,473	123,517	37,441	38,933	2,582
August	190,526	117,945	32,167	37,113	3,301
September	183,756	111,927	33,247	35,264	3,318
1952	1,924,424	1,085,699	443,262	347,500	47,963
January	149,143	81,286	34,778	30,534	2,545
February	146,306	78,660	38,239	25,168	4,239
March	153,641	82,869	41,531	25,476	3,765
April	159,855	85,104	43,267	27,171	4,313
May	157,784	86,519	41,784	25,462	4,019
June	155,549	87,697	36,762	26,878	4,212
July	148,740	86,054	33,435	24,908	4,343
August	159,559	92,163	33,770	29,136	4,490
September	165,728	95,827	35,974	30,243	3,685
October	183,837	107,631	35,230	37,125	3,851
November	165,624	98,156	32,420	31,143	3,905
December	178,657	103,733	36,072	34,256	4,596
1951	1,756,244	1,073,367	345,163	312,944	24,770
1950	1,713,449	1,163,135	269,780	258,075	22,459
1949	1,158,146	790,025	203,650	149,995	14,476

U. S. Bureau of the Census * Estimated

Antimony Imports

Metal imported for consumption in United States—Net Tons

Year	—Antimony Ore— Gross Weight	Sb Content	Needle or Liquidated Sb	Antimony Metal	Type Metal and Antimonial Lead†
1952	18,246	7,945	N.A.	2,996	N.A.
1951	27,354	11,995	6	2,231	676
1950	22,307	9,746	19	4,632	1,936
1949	17,855	7,473	81	1,853	654
1948	41,610	13,464	533	3,201	1,569
1947	28,471	9,257	17	5,879	187

U. S. Department of Commerce. † Estimated Sb content. N.A.—Not available

Magnesium Wrought Products

Shipments—Thousands of Pounds

	1953	1952	1951	1950	1949	1948
Jan.	1,313	1,635	1,522	952	581	314
Feb.	1,474	1,748	1,489	761	636	413
Mar.	1,601	1,712	1,889	868	672	460
Apr.	1,708	1,745	1,531	998	537	516
May	1,690	1,504	1,716	850	756	448
June	1,192	1,428	1,643	1,198	752	526
July	1,589	1,398	1,391	1,177	748	265
Aug.	1,433	1,441	1,497	1,103	671	497
Sept.	1,254	1,305	1,461	1,011	724	707
Oct.	1,410	1,431	1,773	1,269	793	519
Nov.	.....	1,178	1,645	1,305	622	532
Dec.	.....	1,441	1,533	1,318	772	728
Year	18,430	19,030	12,810	8,264	5,865	

U. S. Bureau of Mines

Antimony Production

Domestic mine production of ores and concentrates, Net Tons

Year	Gross Weight	—Antimony Content— Quantity	Average Per Cent
1952	5,571	1,955	35.1
1951	10,484	3,512	33.5
1950	6,888	2,497	36.3
1949	5,260	1,636	31.1
1948	16,239	6,489	40.0
1947	20,026	5,316	26.6

U. S. Bureau of Mines

Antimony Consumption

Industrial use of primary antimony—Net Tons

PRODUCTS	1952	1951	1950	1949
Ammunition	3	4	9	6
Antimonial Lead & Battery Metal	3,716	5,205	4,912	4,737
Bearing Metal and Bearings	1,119	1,368	3,256	873
Cable Covering	43	95	72	172
Castings	80	79	126	49
Collapsible Tubes and Foil	32	18	23	14
Sheet and Pipe	70	180	.....	306
Solder	145	123	300	155
Type Metal	624	709	162	587
Nonmetal Products	8,423	9,798	5,868	4,631
Total	14,255	17,519	15,494	11,530

U. S. Bureau of Mines

Nonferrous Metals

U. S. Tin Imports

Ore (tin content), and Metal (bars, blocks, pigs, etc.) in Long Tons

	Ore	Metal
1953		
Jan.	3,862	7,702
Feb.	4,101	5,251
Mar.	4,573	6,686
Apr.	1,915	7,229
May	2,017	6,739
June	4,230	5,495
July	2,798	5,821
Aug.	1,214	6,992
1952		
Jan.	144	1,005
Feb.	1,472	598
Mar.	821	7,752
Apr.	732	10,894
May	934	7,418
June	3,070	9,951
July	5,481	6,619
Aug.	2,378	8,501
Sept.	1,136	7,686
Oct.	4,869	6,883
Nov.	2,177	5,851
Dec.	3,277	7,180
MONTHLY AVERAGES		
1952	2,208	6,704
1951	2,469	2,315
1950	2,169	6,910
1949	3,193	5,019
1948	3,124	4,060
1947	2,364	2,075
1946	3,178	1,293
1945	2,790	703
1944	2,962	1,112
1943	1,821	993

International Tin Study Group

U. S. Silver Output

(Thousands of ounces; commercial bars, 0.999 fine, and other refined forms.)

	From Domestic Ore†	From Foreign Ore	Total
1953*	34,000	37,000	71,000
Jan.	3,362	3,400	6,762
Feb.	3,112	2,640	5,752
Mar.	3,175	3,471	6,646
Apr.	3,018	3,193	6,211
May	2,823	3,095	5,918
June	1,909	2,536	4,445
July	2,525	2,533	5,058
Aug.	2,652	4,334	6,986
Sept.	2,301	2,613	4,914
1952	40,245	36,653	76,898
Jan.	3,766	4,217	7,983
Feb.	3,430	2,532	5,962
Mar.	3,854	2,678	6,532
Apr.	4,043	3,292	7,335
May	3,273	2,045	5,318
June	3,292	2,751	6,043
July	3,307	3,793	7,100
Aug.	2,272	3,525	5,797
Sept.	3,235	3,004	6,239
Oct.	3,682	2,692	6,374
Nov.	2,998	3,281	6,279
Dec.	3,093	2,843	5,936
1951	39,967	33,837	73,804
1950	42,068	37,656	79,724
1949	34,559	28,226	62,785
1948	36,111	37,680	73,791
1947	36,053	39,645	75,698
1946	21,377	30,371	51,748
1945	29,332	38,786	68,118

† Includes purchases of crude silver by the United States Mint. American Bureau of Metal Statistics

U. S. Tin Consumption

Long Tons

	Consumption: Primary	Secondary	Total	Stocks
1953*				
Jan.	54,000	30,000	84,000	36,000
Feb.	4,441	2,571	7,012	43,293
Mar.	5,162	2,626	7,788	38,257
Apr.	5,192	2,488	7,680	35,203
May	4,985	2,577	7,562	32,766
June	4,989	2,519	7,508	32,189
July	4,329	2,251	6,580	33,019
Aug.	4,257	2,362	6,619	N.A.
Sept.	4,276	2,579	6,855	N.A.
1952	45,299	28,085	73,384	46,625
1951	56,884	31,285	88,169	31,532
1950	71,191	33,273	104,464	63,486
1949	47,163	25,243	72,406	59,813
1948	59,863	30,925	90,788	63,517
1947	59,166	28,934	88,100	68,728
1946	54,627	26,316	80,943	60,585
1945	55,642	27,941	83,583	71,408
1944	59,156	30,813	89,969	89,914
1943	46,253	34,077	80,330	106,784
1942	56,288	29,399	85,687	127,797
1941	103,086	31,609	134,695	146,888

International Tin Study Group; U. S. Bureau of Mines. N.A.—Not available

Nickel Production

Net Tons

	Canada	Other Countries	Estimated Total
1953*	150,000	30,000	180,000
1952†	140,000	25,000	165,000
1951	138,403	22,147	160,550
1950	123,659	36,141	159,800
1949	128,690	32,310	161,000
1948	131,740	34,660	166,400
1947	118,621	35,679	154,300
1946	96,062	42,538	138,600
1945	122,565	37,435	160,000
1944	137,299	35,701	173,000
1943	144,009	40,091	184,100
1942	142,606	31,594	174,200
1941	141,129	37,471	178,600
1940	122,779	31,521	154,300
1939	113,053	21,447	134,500
1938	105,286	22,014	127,300
1937	112,453	19,947	132,400

U. S. Bureau of Mines; Dominion Bureau of Statistics; STEEL. † Preliminary.

Tungsten

U. S. Mines—Pounds

	Production	Shipments
1953		
1st Qtr.	2,020,818	1,960,543
2nd Qtr.	2,142,955	2,128,680
1952	6,822,246	6,836,522
1st Qtr.	1,508,476	1,541,787
2nd Qtr.	1,724,199	1,646,475
3rd Qtr.	1,673,441	1,638,545
4th Qtr.	1,916,130	2,009,715
1951	5,913,750	5,972,551
1950	3,965,040	4,587,687
1949	2,896,084	2,631,506
1948	4,033,389	3,538,287
1947	3,026,470	2,944,622
1946	4,671,042	4,942,282

U. S. Bureau of Mines

U. S. Tin Smelter Output

Long Tons

	1953	1952	1951	1950	1949
Jan.	4,000	1,802	3,211	2,627	3,257
Feb.	3,400	1,800	3,096	2,362	3,254
Mar.	3,850	1,800	3,036	2,729	3,104
Apr.	3,750	1,800	3,058	2,484	2,851
May	3,100	1,800	3,059	2,852	3,007
June	3,000	0	2,655	2,204	3,006
July	3,000	0	2,406	2,256	2,910
Aug.	2,600	50	2,505	2,396	3,005
Sept.	2,700	2,450	2,155	2,805	2,910
Oct.	2,751	3,364	2,091	3,209	2,984
Nov.	2,750	4,020	1,806	3,207	2,994
Dec.		3,705	1,805	3,005	2,791
Total	38,700*	22,591	30,921	32,136	36,053

Office of Domestic Commerce. *Estimated

World Tin

Long Tons

	Production	Consumption	Stocks
1953*	181,500	128,500	88,000
Jan.	17,500	11,500	99,100
Feb.	14,400	10,500	93,200
Mar.	14,600	11,500	88,800
Apr.	16,400	11,100	88,600
May	14,200	10,800	85,100
June	13,500	11,300	84,100
July	15,900	11,100	83,500
Aug.	15,000	10,800	83,000
1952	168,000	130,000	103,200
1951	168,000	139,500	99,800
1950	174,000	151,500	118,200
1949	168,000	115,000	130,800
1948	157,500	131,500	133,100
1947	124,500	127,000	135,200
1946	99,500	114,500	153,000
1945	89,400	97,500	170,900
1944	93,700	100,500	156,500
1943	108,500	90,500	166,100

International Tin Study Group. Figures are partly estimated and include substantial revisions from previously reported totals.

Molybdenum Products

Comprises ferromolybdenum, molybdic oxide, and molybdenum salts and metal

Pounds

	Production	Shipments†	Stocks
1953			
1st Qtr.	8,138,000	8,557,000	3,317,000
2nd Qtr.	8,392,000	8,275,000	3,668,000
1952			
1st Qtr.	7,890,900	8,045,800	2,882,300
2nd Qtr.	7,942,000	7,112,200	3,712,200
3rd Qtr.	8,079,700	6,582,800	5,216,600
4th Qtr.	8,470,000	10,313,500	3,373,000
1951	32,775,000	31,232,700	3,037,200
1st Qtr.	8,692,800	7,727,800	2,459,900
2nd Qtr.	7,734,800	7,935,100	2,259,600
3rd Qtr.	8,057,700	7,437,500	2,879,700
4th Qtr.	8,289,700	8,132,200	3,037,200
1950	25,347,800	34,690,800	1,494,900
1949	19,624,200	16,333,100	10,837,900
1948	24,445,300	25,024,700	7,546,800

† Including exports
U. S. Bureau of Mines

Manganese

(Supplies for United States consumption, net tons.)

	Domestic Mine Shipments	General Imports: Ore	General Imports: Ferro-manganese†	Exports: Ore	Exports: Ferro-manganese†	Net Supply
1953*	163,000	3,400,000	150,000	6,500	3,500	3,700,000
Jan.	9,600	289,445	2,258	449	596	300,258
Feb.	16,500	269,279	15,714	1,302	146	300,045
Mar.	12,400	239,977	4,352	371	366	255,992
Apr.	12,700	343,535	15,164	429	210	370,760
May	13,000	293,178	7,552	384	130	313,216
June	17,500	301,574	35,786	969	354	353,537
July	12,600	288,495	44,940	826	280	354,929
1952	105,000	2,671,729	126,502	9,748	3,256	2,890,227
1951	95,200	1,768,773	240,980	8,029	1,267	2,095,657
1950	134,500	1,834,925	221,684	8,962	1,160	2,180,987
1949	126,100	1,544,584	130,028	5,033	13,254	1,782,425

† Expressed in terms of ore. * Estimated. U. S. Bureau of Mines

Molybdenum Concentrates

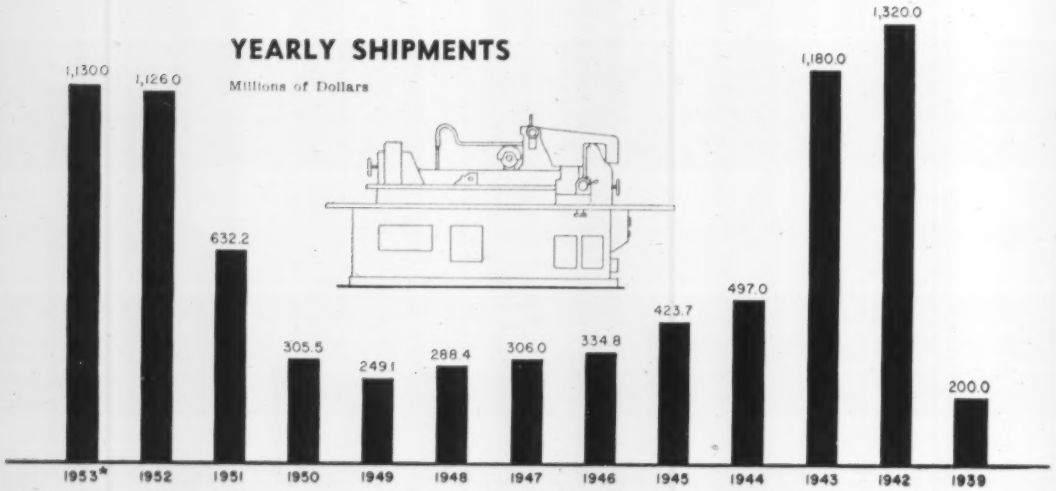
Pounds

	Production	Shipments†	Consumption	Stocks
1953				
1st Qtr.	12,133,000	13,239,000	8,512,000	6,625,000
2nd Qtr.	14,379,000	12,466,000	8,592,000	8,333,000
1952				
1st Qtr.	8,905,700	10,382,400	7,991,200	3,971,800
2nd Qtr.	10,253,200	9,492,100	7,995,900	5,415,700
3rd Qtr.	13,042,000	10,952,900	8,253,900	7,262,600
4th Qtr.	11,065,500	11,897,600	8,474,000	6,856,000
1951	38,855,000	37,955,000	33,691,000	5,057,900
1950	28,480,000	44,544,000	26,629,000	4,686,800
1949	22,529,800	23,280,400	19,960,000	19,159,100

† Including exports, plus concentrates converted to oxide at Miami, Ariz., and Langeloth, Pa.
U. S. Bureau of Mines

YEARLY SHIPMENTS

Millions of Dollars



INDEX OF MACHINE TOOL NEW ORDERS

Base: Average Shipments in 1945-46-47=100%

TOTAL NEW ORDERS (DOMESTIC AND FOREIGN)

	1953	1952	1951	1950	1949	1948	1947	1946	1945	1944	1943	1942	1939
Jan.	255.8	347.8	475.4	99.7	87.0	83.1	71.7	115.6	208.9	100.6	222.8	378.7	49.0
Feb.	282.1	318.8	615.3	89.2	80.9	77.3	63.8	79.8	205.4	118.9	270.4	471.1	51.7
Mar.	327.0	324.3	590.3	107.4	93.5	86.3	74.3	106.3	181.8	143.9	348.6	1,164.5	57.5
Apr.	276.8	293.5	516.1	98.9	70.1	86.3	69.8	123.4	172.4	194.7	245.4	902.1	48.7
May	246.4	284.6	483.0	116.4	63.7	73.5	76.9	107.9	154.8	207.2	212.9	639.9	69.0
June	273.4	342.9	558.8	124.1	53.6	83.4	90.9	109.1	123.3	182.3	176.6	563.7	68.3
July	247.3	376.3	490.6	253.1	48.0	74.0	81.1	99.0	100.3	121.6	140.2	477.3	73.0
Aug.	286.9	311.1	488.9	305.1	51.5	73.7	62.1	99.9	103.1	147.0	136.2	392.1	64.6
Sept.	223.7	302.4	380.2	280.6	57.7	73.1	63.7	86.4	85.8	126.5	125.5	331.2	119.4
Oct.	199.2	243.3	403.9	289.6	56.8	67.4	81.0	85.3	99.3	206.6	118.1	308.8	160.0
Nov.	....	205.4	330.5	291.9	84.3	72.2	75.6	73.2	89.1	210.6	127.2	343.9	174.2
Dec.	....	225.2	376.5	410.1	82.5	76.7	81.1	72.7	119.4	221.2	114.1	265.5	264.6
Avg.	....	298.0	475.8	205.5	69.1	77.2	74.3	96.5	137.0	165.0	186.5	519.9	100.0

DOMESTIC

	1953	1952	1951	1950	1949	1948	1947
Jan.	229.5	314.2	414.1	73.0	65.1	69.1	50.7
Feb.	259.2	304.4	537.3	70.4	54.4	64.6	48.0
Mar.	309.6	301.0	488.2	82.5	71.2	70.2	54.2
Apr.	262.9	277.9	450.0	81.5	47.0	72.2	51.0
May	231.7	253.2	447.3	98.0	47.9	62.1	60.6
June	256.8	322.6	502.4	101.1	37.9	71.5	73.7
July	228.7	361.4	435.7	230.8	34.0	60.7	64.4
Aug.	269.3	288.4	430.2	270.9	32.7	60.1	47.5
Sept.	207.2	279.3	353.2	253.4	44.0	61.5	49.0
Oct.	177.4	220.8	362.8	240.1	43.1	53.4	65.0
Nov.	....	191.1	301.5	265.3	67.3	54.1	64.1
Dec.	....	205.6	358.2	297.3	60.1	60.5	66.3
Avg.	....	276.6	423.4	172.0	50.4	63.3	57.9

FOREIGN

	1953	1952	1951	1950	1949	1948	1947
Jan.	26.3	33.6	61.3	26.7	21.9	14.0	21.0
Feb.	22.9	14.4	78.2	18.8	26.5	12.7	15.8
Mar.	17.4	23.3	102.1	24.9	22.3	16.1	20.1
Apr.	13.9	15.6	66.1	17.4	23.1	14.1	18.8
May	14.7	31.4	35.7	18.4	15.8	11.4	16.3
June	16.6	20.3	56.4	23.0	15.7	11.9	17.3
July	18.6	14.9	54.9	22.3	14.0	13.3	16.7
Aug.	17.6	22.7	58.7	34.2	18.8	13.6	14.6
Sept.	16.5	23.1	27.0	27.2	13.7	11.6	14.7
Oct.	21.8	22.5	41.1	49.5	13.7	14.0	16.0
Nov.	....	14.3	29.0	26.6	17.0	18.1	11.5
Dec.	....	19.6	18.3	112.8	22.4	16.2	14.8
Avg.	....	21.3	52.4	33.5	18.7	13.9	16.4

National Machine Tool Builders' Association

* Estimated

INDEX OF MACHINE TOOL SHIPMENTS

Base: Average Shipments in 1945-46-47=100%

	1953	1952	1951	1950	1949	1948	1947	1946	1945	1944	1943	1942	1939
Jan.	361.6	266.6	114.3	52.8	68.8	75.3	91.7	105.9	130.0	190.6	297.0	282.5	36.2
Feb.	354.5	279.6	123.8	56.1	70.3	87.1	92.4	94.2	125.9	169.6	387.5	285.5	39.9
Mar.	375.9	299.5	158.9	75.3	75.8	83.6	100.4	95.2	140.4	175.5	424.2	332.6	45.4
Apr.	372.7	307.9	157.7	61.6	74.7	82.0	93.3	99.0	142.6	139.9	399.1	349.6	47.3
May	356.0	323.0	175.1	82.5	72.8	82.6	89.2	94.2	140.5	141.4	385.1	362.9	52.8
June	342.2	330.8	182.8	91.9	79.0	94.4	84.1	99.8	146.0	140.2	367.7	375.7	57.5
July	267.6	259.7	144.7	68.3	60.7	62.4	65.4	78.3	115.4	110.8	329.9	384.2	46.7
Aug.	299.6	317.0	178.9	95.7	67.3	69.8	63.6	92.5	113.1	119.0	296.9	396.8	56.8
Sept.	328.3	368.3	189.8	101.6	67.6	84.7	77.0	87.5	96.3	121.4	290.3	405.4	60.9
Oct.	348.2	357.8	221.3	100.9	62.3	80.4	94.8	99.9	109.5	126.9	284.8	439.7	71.7
Nov.	....	342.5	226.0	110.9	67.6	76.2	84.7	90.4	91.6	122.7	243.0	408.8	75.4
Dec.	....	355.0	264.7	135.7	75.7	96.9	98.4	95.2	81.7	128.8	205.7	446.3	82.9
Avg.	....	317.3	178.2	86.1	70.2	81.3	86.2	94.3	119.4	140.6	324.3	372.5	58.4

National Machine Tool Builders' Association

PRODUCERS' SHIPMENTS OF MACHINE TOOLS

Dollar Value and Number of Units

CLASSES OF MACHINE TOOLS	1952 Dollar Value and No. Units	1951 Dollar Value and No. Units	1950 Dollar Value and No. Units	1949 Dollar Value and No. Units	1948 Dollar Value and No. Units	1942 Dollar Value and No. Units
Boring Machines	$147,932,000 4,275 Units	$75,068,000 2,518 Units	$29,402,000 1,363 Units	$29,430,000 1,212 Units	$24,098,000 1,268 Units	$137,472,000 9,697 Units
Broaching Machines	21,014,000 1,016 Units	11,975,000 681 Units	4,883,000 374 Units	3,411,000 290 Units	3,779,000 343 Units	9,022,000 1,007 Units
Drilling Machines	108,111,000 30,492 Units	70,916,000 19,257 Units	33,129,000 9,917 Units	25,271,000 6,305 Units	32,816,000 10,125 Units	103,726,000 47,654 Units
Gear-cutting and Finishing Machines	47,462,000 2,725 Units	38,336,000 2,452 Units	19,819,000 1,402 Units	14,231,000 1,095 Units	16,407,000 1,367 Units	51,884,000 6,435 Units
Grinding and Polishing Machines (except gear-tooth grinding, honing, lapping, polishing and buffing machines)	205,643,000 88,341 Units	120,823,000 105,090 Units	60,859,000 79,274 Units	45,660,000 64,257 Units	47,294,000 98,792 Units	209,345,000 54,009 Units
Lathes	285,916,000 46,953 Units	170,528,000 43,107 Units	89,716,000 30,251 Units	62,289,000 18,631 Units	81,106,000 29,322 Units	455,250,000 88,878 Units
Milling Machines	159,021,000 16,158 Units	70,257,000 11,287 Units	36,452,000 6,975 Units	31,400,000 4,397 Units	34,914,000 6,064 Units	246,223,000 47,565 Units
Planers	8,641,000 158 Units	6,638,000 141 Units	3,035,000 84 Units	3,699,000 99 Units	4,828,000 157 Units	29,931,000 981 Units
Shapers (except gear shapers)	9,933,000 1,423 Units	6,095,000 1,096 Units	3,397,000 794 Units	2,831,000 666 Units	5,826,000 1,389 Units	n.a. n.a.
All Other Machine Tools	70,992,000 n.a.	58,698,000 n.a.	35,051,000 n.a.	23,148,000 n.a.	26,453,000 n.a.	78,915,000 50,960 Units
Total Machine Tools	$1,064,865,000 n.a.	$639,344,000 n.a.	$315,743,000 n.a.	$241,370,000 n.a.	$277,521,000 n.a.	$1,321,748,000 307,186 Units

U. S. Bureau of the Census

n.a. Not available

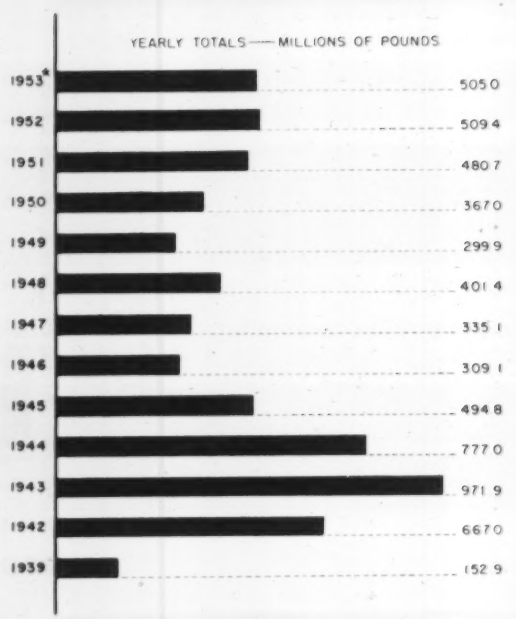
WELDING ELECTRODES

Shipments in Pounds

	Mild Steel	Alloy	Nonferrous	Total
1953				
9 Mos.	341,005,772	64,522,338	1,574,249	407,092,359
Jan.	48,053,802	7,856,755	135,197	56,045,754
Feb.	42,907,987	8,501,619	248,148	51,657,754
Mar.	47,248,343	9,208,469	288,454	56,735,266
Apr.	41,415,452	8,821,643	136,235	50,373,330
May	40,753,719	6,744,714	221,600	47,720,033
June	36,622,679	7,366,452	136,685	44,125,816
July	28,902,745	5,980,897	121,047	35,004,689
Aug.	25,656,698	4,945,935	168,704	30,771,337
Sept.	29,444,347	5,095,854	118,179	34,658,380
Oct.	.....	.....	.....	.....
Nov.	.....	.....	.....	.....
Dec.	.....	.....	.....	.....
1953*	.....	.....	.....	505,000,000
1952	425,290,499	82,633,922	1,519,208	509,443,629
1951	413,444,913	65,903,970	1,361,836	480,710,719
1950	322,954,832	42,574,710	1,861,686	367,391,228
1949	273,463,740	24,753,807	1,715,362	299,932,909
1948	369,019,831	30,214,928	2,124,496	401,359,255
1947	307,756,495	25,172,382	2,149,768	335,078,645
1946	284,126,356	24,991,208†	.....	309,117,564
1945	435,789,217	59,029,938†	.....	494,819,155
1944	707,756,964	69,236,137†	.....	776,993,101
1943	.....	.....	.....	971,929,782
1942	.....	.....	.....	666,965,595
1939	.....	.....	.....	152,863,373

† Includes both alloy and nonferrous electrodes. * Estimated.

National Electrical Manufacturers Association



Blowers and Fans

Shipments—Thousands of Dollars

Qtrs.	1953	1952	1951	1950
1st	42,543	31,631	30,256	19,345
2nd	53,233	38,960	32,496	28,329
3rd	46,415	36,472	29,608	25,020
4th	.....	32,213	30,037	25,993
Total	.....	139,276	122,397	98,687

U. S. Bureau of the Census

Air Washers

Shipments—Thousands of Dollars

Qtrs.	1953	1952	1951	1950
1st	223	222	509	210
2nd	222	313	510	425
3rd	319	308	271	269
4th	.....	381	304	578
Total	.....	1,224	1,594	1,482

U. S. Bureau of the Census

Unit Heaters

Shipments—Thousands of Dollars

Qtrs.	1953	1952	1951	1950
1st	11,910	13,376	15,639	7,596
2nd	12,001	11,119	14,000	8,049
3rd	16,157	13,085	14,497	13,519
4th	.....	15,728	17,755	16,467
Total	.....	53,308	61,891	45,631

U. S. Bureau of the Census

Air Conditioning, Commercial Refrigeration Equipment

Factory Shipments—Number of Units and Value in Thousands of Dollars

	CONDENSING UNITS		COMPRESSORS, COMPRESSOR UNITS		ICE-MAKING MACHINES	
	Number	Value	Number	Value	Number	Value
1952	598,473	$64,834	1,677,300	$71,047	26,693	$12,838
1951	840,176	75,672	1,051,937	56,669	12,998	8,804
1950	885,913	75,833	954,368	46,977	14,914	8,907
1949	610,341	53,534	604,431	29,929	6,902	4,641
1948	841,609	73,443	459,390	33,493	5,947	5,266
1947	1,039,772	98,296	n.a.	34,586	7,822	3,122
1946	755,538	55,379	191,770	15,377	n.a.	n.a.
1940	211,021	18,808	84,889	7,084	1,045	628

	CENTRIFUGAL-REFRIGERATION SYSTEMS		HEAT EXCHANGER EQUIPMENT		SELF-CONTAINED AIR-CONDITIONING UNITS	
	Number	Value	Number	Value	Number	Value
1952	363	$14,040	.....	$63,456	424,105	$133,101
1951	441	15,300	.....	64,935	282,488	93,573
1950	382	12,249	.....	61,337	257,263	86,913
1949	285	8,189	.....	40,925	123,709	50,584
1948	361	10,351	.....	48,552	111,620	49,008
1947	313	7,814	.....	63,025	74,976	39,509
1946	312	6,593	.....	40,451	47,664	19,500
1940	112	2,403	.....	17,110	n.a.	n.a.

U. S. Bureau of the Census

n.a.—Not available

Industrial Control Apparatus

Sales

Qtrs.	1953	1952	1951	1950	1949	1948
1st	$50,057,978	$50,265,710	$38,268,776	$23,841,436	$24,815,926	$28,239,799
2nd	53,213,139	54,427,788	46,397,618	27,663,410	27,842,778	29,872,234
3rd	49,444,714	49,085,727	44,551,726	29,872,967	22,869,582	27,289,390
4th	.....	55,129,668	50,715,549	37,821,630	23,992,277	29,865,582
Total	.....	$208,908,893	$179,933,669	$119,199,443	$99,520,563	$115,267,005

National Electrical Manufacturers Association

Motors and Generators

New Orders—Thousands of Dollars

Polyphase Induc. Motors, 1-200 hp

Qtrs.	1953	1952	1951
1st	41,127	42,455	64,221
2nd	46,319	36,445	56,573
3rd	.....	36,946	44,878
4th	.....	36,954	44,189
Total	.....	152,800	209,861

DC Generators & Motors, 1-200 hp

Qtrs.	1953	1952	1951
1st	7,512	8,793	10,666
2nd	8,821	13,614	12,779
3rd	.....	9,269	9,160
4th	.....	8,807	10,713
Total	.....	40,483	43,318

YEARLY TOTALS

Polyphase Induc. Motors, 1-200 hp		DC Generators & Motors, 1-200 hp	
1952	152,800	1952	40,483
1951	209,861	1951	43,318
1950	155,308	1950	28,874
1949	76,063	1949	16,900
1948	95,577	1948	22,273
1947	122,043	1947	20,381
1946	142,464	1946	20,942
1945	87,621	1945	37,194
1944	68,555	1944	74,581
1943	84,862	1943	83,494

National Electrical Mfrs. Assn.

Screw Machine Products Shipments

Index—1946-1949=100

1953					
Jan.	244	May	252	Sept.	217
Feb.	225	June	250	Oct.	217
Mar.	256	July	215	Nov.	.....
Apr.	256	Aug.	232	Dec.	.....
1952					
Jan.	225	May	203	Sept.	174
Feb.	218	June	198	Oct.	201
Mar.	223	July	148	Nov.	206
Apr.	170	Aug.	178	Dec.	238

YEARLY AVERAGES

1953(10 Mos.) ... 236 1952 198

National Screw Machine Products Association

Electric Industrial Trucks and Tractors

Shipments

	Domestic	Export	Total
1953			
9 Mos.	6,340	425	6,765
Jan.	669	35	704
Feb.	743	36	779
Mar.	794	38	832
Apr.	690	42	732
May	640	37	677
June	902	43	945
July	591	82	673
Aug.	576	50	626
Sept.	735	62	797
Oct.	...	...	...
Nov.	...	...	...
Dec.	...	...	...
1952	6,826	583	7,409
Jan.	607	51	658
Feb.	611	70	681
Mar.	646	56	702
Apr.	598	45	643
May	617	35	652
June	554	94	648
July	369	25	394
Aug.	528	36	564
Sept.	488	28	516
Oct.	549	39	588
Nov.	585	37	622
Dec.	674	67	741
1951	5,779	746	6,525
Jan.	393	47	440
Feb.	398	63	461
Mar.	519	76	595
Apr.	354	43	397
May	420	44	464
June	519	85	604
July	484	54	538
Aug.	529	62	591
Sept.	385	62	447
Oct.	545	42	587
Nov.	652	76	728
Dec.	581	92	673
1950	2,486	322	2,808
1949	2,251	350	2,601
1948	2,904	543	3,447
1947	3,565	566	4,131
1946	2,714	160	2,874
1945	3,627	224	3,851
1944	4,380	395	4,775
1943	4,280	211	4,491

U. S. Bureau of the Census

Steel Boilers

New Orders

(100 sq ft or more of heating surface)

GRAND TOTAL—ALL TYPES

	Number	Sq ft
1952	13,784	16,899,823
1951	15,484	23,489,097
1950	19,795	23,030,614
1949	14,346	13,094,902
1948	16,408	18,419,968
1947	16,110	18,751,755
1946	19,473	22,645,814
1945	13,076	18,372,439
1944	8,670	13,022,626
1943	10,994	25,587,435
1942	15,847	39,570,941

STATIONARY BOILERS

1952	5,556	11,893,401
1951	7,171	17,698,094
1950	7,827	16,468,587
1949	5,190	8,097,503
1948	6,354	12,628,660
1947	8,140	14,786,298
1946	10,452	18,652,274
1945	7,317	13,244,916
1944	5,006	7,260,313
1943	4,834	5,950,027
1942	6,155	15,658,704

MARINE BOILERS

1952	259	1,014,180
1951	281	1,526,452
1950	189	399,998
1949	76	281,999
1948	153	984,108
1947	35	109,753
1946	96	121,705
1945	658	2,653,800
1944	1,312	4,535,814
1943	4,060	18,346,455
1942	4,774	20,771,539

STEEL HEATING BOILERS

1952	7,989	4,192,242
1951	8,032	4,264,521
1950	11,799	6,162,049
1949	9,060	4,715,400
1948	9,901	4,827,202
1947	7,935	3,855,704
1946	8,925	3,871,835
1945	5,071	2,473,723
1944	2,352	1,226,499
1943	2,080	1,290,953
1942	4,718	3,142,898

U. S. Bureau of the Census

Foundry Equipment Shipments

Dollar Volume

	NEW EQUIPMENT			REPAIRS		
	1953	1952	1951	1953	1952	1951
Jan.	1,434,055	2,470,990	1,319,628	953,880	1,050,171	1,051,322
Feb.	1,009,142	2,400,533	1,324,955	988,983	1,254,814	980,826
Mar.	1,330,284	2,219,522	1,555,705	1,031,454	1,079,688	1,193,149
Apr.	1,593,809	2,408,582	1,820,795	1,093,226	1,121,741	1,123,228
May	1,478,488	2,205,193	2,065,515	1,100,027	1,026,495	1,175,379
June	1,592,489	2,362,057	2,271,729	1,035,048	1,023,317	1,000,061
July	1,711,295	1,808,622	1,748,113	994,759	871,719	990,494
Aug.	1,755,913	1,604,814	1,906,368	976,327	937,446	1,112,325
Sept.	1,607,982	1,580,809	2,383,841	990,536	969,752	1,123,386
Oct.	1,522,179	1,869,108	2,565,715	1,063,046	1,076,380	1,326,639
Nov.	.....	1,074,671	2,325,261	.....	957,396	1,019,152
Dec.	.....	1,683,494	2,798,525	.....	964,171	1,026,385
Total	.....	23,688,395	24,026,150	.....	12,333,060	13,122,340

Foundry Equip. Mfrs. Assn.

Orders Placed for New Foundry Equipment

Indexes based on 1937-38-39 monthly average as 100%

	1953		1952		1951		1950	1949
	Dollars	Index	Dollars	Index	Dollars	Index	Index	Index
Jan.	1,379,130	301.0	1,862,185	404.5	3,075,267	668.0	159.3	149.9
Feb.	1,178,637	257.3	922,485	200.4	2,940,273	638.6	113.1	144.4
Mar.	1,817,717	396.7	1,427,245	310.0	2,757,763	599.0	225.2	190.8
Apr.	1,394,686	303.0	1,773,002	385.1	2,256,232	490.1	160.6	172.0
May	1,567,803	294.4	1,036,915	225.2	1,987,472	431.7	294.9	121.9
June	2,997,799	446.8	1,628,671	353.8	1,810,435	393.2	622.7	164.9
July	2,362,294	440.8	1,583,121	343.9	1,796,755	390.3	401.8	146.6
Aug.	3,615,084	633.3	1,434,404	311.6	1,862,084	404.5	693.6	127.1
Sept.	1,575,294	317.2	1,684,911	365.9	1,595,440	346.5	483.8	166.6
Oct.	1,098,954	202.9	1,538,448	335.8	1,714,494	372.4	526.8	133.5
Nov.	.....	...	1,182,664	258.1	1,406,315	305.5	885.5	270.4
Dec.	.....	...	1,572,906	343.3	1,061,108	230.5	526.2	201.0
Total	.....	.....	17,646,957		24,263,638			

Foundry Equip. Mfrs. Assn.

Pumps

(Steam, power, centrifugal, rotary)

New Orders—Thousands of Dollars

	1953	1952	1951	1950	1949
Jan.	5,762	5,517	6,477	2,587	3,366
Feb.	6,521	6,020	6,480	2,938	3,247
Mar.	8,245	5,925	7,654	3,313	3,593
Apr.	7,758	6,354	7,583	3,376	2,659
May	4,629	6,140	6,371	3,668	2,775
June	5,690	7,957	6,852	4,453	3,619
July	5,533	6,296	8,358	4,080	3,358
Aug.	4,886	5,921	5,911	6,429	3,767
Sept.	4,845	5,258	6,552	5,191	2,914
Oct.	...	5,534	6,506	4,685	2,539
Nov.	...	4,130	5,908	5,961	2,525
Dec.	...	6,575	5,553	6,720	2,560
Total	...	71,630	80,205	53,401	36,386

MONTHLY AVERAGES

1952	5,969	1946	3,105
1951	6,684	1945	2,869
1950	4,450	1944	3,436
1949	3,032	1943	6,214
1948	3,932	1942	6,155
1947	3,332	1941	3,606

Hydraulic Institute

Machinery & Equipment

METALWORKING FACTS AND FIGURES

EARTHMOVING and EXCAVATING EQUIPMENT

Manufacturers' Shipments
(Values in Thousands of Dollars)

Wheel-type Heavy Duty Industrial Tractors

	Units	Value
1953	....	.....
1st Qtr.	745	$11,086
2nd Qtr.	1,107	16,325
3rd Qtr.	664	9,901
4th Qtr.	....	.....
1952	4,026	$59,847
1st Qtr.	1,195	16,424
2nd Qtr.	1,340	23,797
3rd Qtr.	862	11,225
4th Qtr.	629	8,401
1951	3,505	$55,238
1950	2,065	24,769
1949	1,047	12,499

Road Construction and Maintenance Machinery

	Units	Value
1953	....	.....
1st Qtr.	....	$34,929
2nd Qtr.	....	38,179
3rd Qtr.	....	24,361
4th Qtr.	....	.....
1952	....	$159,592
1st Qtr.	....	45,436
2nd Qtr.	....	46,834
3rd Qtr.	....	33,494
4th Qtr.	....	33,828
1951	....	$151,779
1950	....	117,540
1949	....	96,883
1948	....	117,908

Construction Machinery for Mounting on Tractors

	Units	Value
1953	....	.....
1st Qtr.	....	$20,712
2nd Qtr.	....	22,037
3rd Qtr.	....	18,836
4th Qtr.	....	.....
1952	....	$74,783
1st Qtr.	....	16,951
2nd Qtr.	....	22,263
3rd Qtr.	....	16,973
4th Qtr.	....	18,596
1951	....	$64,816
1950	....	58,769
1949	....	38,177

U. S. Bureau of the Census

Power Cranes and Shovels

	Units	Value
1953	....	.....
1st Qtr.	2,309	$.....
2nd Qtr.	2,238	.....
3rd Qtr.	1,539	.....
4th Qtr.	....	.....
1952	7,747	$.....
1st Qtr.	2,006	.....
2nd Qtr.	1,984	.....
3rd Qtr.	1,652	.....
4th Qtr.	2,105	.....
1951	7,333	$180,680
1950	5,108	109,006
1949	4,114	89,204
1948	8,289	158,586

Tracklaying Tractors

	Units	Value
1953	....	.....
1st Qtr.	13,454	$84,795
2nd Qtr.	14,346	93,086
3rd Qtr.	12,365	84,615
4th Qtr.	....	.....
1952	48,155	$280,841
1st Qtr.	14,303	78,701
2nd Qtr.	14,883	82,674
3rd Qtr.	7,621	44,088
4th Qtr.	11,348	75,378
1951	48,322	$263,579
1950	43,590	223,042
1949	42,749	196,622
1948	39,949	167,341

Portable Well and Blast Hole Drills

	Units	Value
1953	....	.....
1st Qtr.	226	$2,201
2nd Qtr.	243	2,059
3rd Qtr.	217	1,782
4th Qtr.	....	.....
1952	732	$6,769
1st Qtr.	165	1,622
2nd Qtr.	164	1,408
3rd Qtr.	197	1,750
4th Qtr.	206	1,989
1951	660	$5,818
1950	627	4,472
1949	807	6,774
1948	1,641	10,914

Trucks, Truck Tractors, Trailers and Wagons

OFF-HIGHWAY TYPE

	Units	Value
1953	....	.....
1st Qtr.	447	$7,056
2nd Qtr.	591	10,093
3rd Qtr.	538	8,039
4th Qtr.	....	.....
1952	2,283	$32,805
1st Qtr.	766	10,072
2nd Qtr.	631	9,716
3rd Qtr.	455	6,322
4th Qtr.	431	6,695
1951	2,611	$36,840

Gear Sales

Indexes of New Orders Placed
1947-1948-1949=100 per cent

	1953	1952	1951	1950
Jan.	161.4	670.6†	764.6†	280.2†
Feb.	188.1	539.5†	809.1†	272.9†
Mar.	158.9	517.1†	830.7†	358.4†
Apr.	217.1	478.7†	742.5†	328.6†
May	189.8	425.9†	667.1†	363.1†
June	146.5	452.3†	866.9†	401.0†
July	120.7	145.3	589.1†	410.7†
Aug.	121.6	132.3	564.2†	617.4†
Sept.	135.6	143.4	630.1†	654.5†
Oct.	211.1	160.8	703.4†	564.8†
Nov.	....	150.9	530.0†	554.9†
Dec.	....	140.9	716.5†	680.4†

†Average Month 1935-1939=100 per cent

American Gear Manufacturers Association

Electric Industrial Furnaces

New Orders

	Units	Kilowatts	Value
1953			
9 Mos.	5,214	107,134	$15,341,319
January	549	10,606	1,654,778
February	576	8,389	1,672,368
March	575	9,781	1,301,302
April	655	16,643	1,796,310
May	605	10,807	1,798,617
June	537	13,713	2,095,396
July	777	16,131	2,245,795
August	414	13,745	1,903,500
September	506	6,319	872,853
October	....	.....	.....
November	....	.....	.....
December	....	.....	.....
1952	7,488	179,719	$24,783,179
January	674	19,829	2,855,761
February	699	9,624	1,362,736
March	744	13,788	2,099,639
April	667	15,039	2,297,949
May	693	23,630	3,713,299
June	567	14,255	1,552,022
July	482	16,937	2,530,164
August	610	13,612	1,625,874
September	563	13,019	1,412,364
October	742	18,958	2,458,803
November	493	8,748	1,240,643
December	554	12,280	1,633,925
1951	9,392	324,453	$43,497,718
1950	5,891	127,178	13,880,665
1949	4,664	48,525	5,284,021

Industrial Furnace Mfrs. Assn. Inc.

Fuel Fired Industrial Furnaces

(Except for hot rolling steel mills)
New Orders

	Units	Value
1953		
9 Mos.	1,181	$28,340,253
January	144	3,540,328
February	132	3,995,836
March	130	3,607,096
April	145	3,016,664
May	106	1,128,812
June	185	2,550,242
July	129	2,017,235
August	99	5,465,003
September	111	3,019,037
October	....	.....
November	....	.....
December	....	.....
1952	1,861	$38,770,601
January	135	3,378,679
February	139	2,413,453
March	148	1,813,109
April	178	3,606,456
May	174	3,031,722
June	127	2,954,493
July	193	6,727,960
August	152	5,258,960
September	144	2,461,844
October	151	1,506,547
November	123	2,382,426
December	197	3,234,952
1951	2,444	$59,262,020
1950	1,508	22,338,382
1949	800	6,391,107

Industrial Furnace Mfrs. Assn. Inc.

Batteries Shipped

Automotive Replacement Only—Thousands

	1953	1952	1951	1950	1949	1948
Jan.	1,571	1,639	1,979	1,551	1,313	2,530
Feb.	1,162	963	1,469	1,240	873	2,382
Mar.	1,202	769	1,176	1,259	592	1,775
Apr.	1,245	850	1,892	967	527	1,280
May	1,455	1,137	1,480	1,264	724	1,086
June	2,004	1,535	1,443	1,739	1,119	1,267
July	2,528	2,526	1,705	2,177	1,730	1,592
Aug.	2,707	2,905	2,239	3,000	2,798	2,663
Sept.	2,853	2,874	2,172	3,091	2,945	2,793
Oct.	....	3,112	2,640	3,178	2,719	3,007
Nov.	....	2,168	2,232	2,680	2,253	2,685
Dec.	....	1,975	1,792	2,296	1,790	2,015

YEARLY TOTALS

1952	22,453	1949	19,383
1951	22,219	1948	3,932
1950	24,442	1947	3,332

U. S. Department of Commerce

Rigid Steel Conduit and Fittings

Shipments—Net Tons

	1953	1952	1951	1950
Jan.	21,946	25,066	25,055	15,674
Feb.	23,188	24,731	23,389	16,100
Mar.	26,058	26,749	28,590	17,708
Apr.	22,182	22,272	27,464	16,515
May	22,206	22,173	27,891	17,219
June	....	13,422	27,749	21,645
July	....	6,824	23,890	24,723
Aug.	....	16,225	25,017	30,543
Sept.	....	25,456	25,941	29,123
Oct.	....	21,171	26,680	25,875
Nov.	....	20,213	26,409	24,489
Dec.	....	25,780	23,871	27,561

YEARLY TOTALS

1952	250,082	1949	212,913
1951	311,946	1948	281,698
1950	267,175	1947	258,134

U. S. Department of Commerce

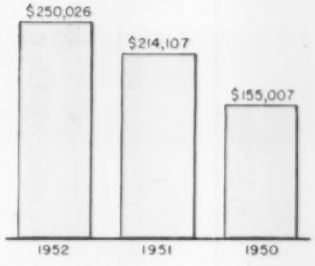
METALWORKING MACHINERY (Except Machine Tools)

Factory Shipments

	1952 Units	1952 Value (thousands)	1951 Units	1951 Value (thousands)	1950 Units	1950 Value (thousands)
Presses (including forging)	17,269	$106,994	20,033	$106,625	14,998	$74,796
Forging Machines (except presses)	1,262	16,366	1,367	15,354	1,248	9,953
Punching and Shearing Machines (power)	4,532	28,081	4,796	26,549	3,981	18,778
Punching and Shearing Machines (manual)	4,460	1,113	5,390	1,349	5,148	1,072
Bending and Forming Machines (power)	6,581	35,338	6,372	27,409	6,094	20,209
Bending and Forming Machines (manual)	15,971	3,206	15,140	3,031	16,677	2,824
Riveting Machines (except hand-held portable type)	4,556	7,327	3,354	4,279	3,319	3,401
Metal Container Making Machines	1,297	14,003	1,974	15,340	2,122	12,469
Die Casting Machines	229	3,422	294	4,707	313	4,694
Wire Weaving and Wire Fabricating Machines	865	3,792	913	4,487	572	2,849
Drawing Machines and Draw Benches	526	5,637	510	4,977	374	3,962
Total		$250,026		$214,107		$155,007

VALUE OF FACTORY SHIPMENTS

(Thousands)



U. S. Bureau of the Census

Arc Welding Sets

Units Ordered, Excluding Exports

	Single Operator, Variable Voltage, DC Sets: Motor Drive	Engine Drive	Generators Only	Transformer Welders: Industrial Type	Limited Input Type
1953					
Jan.	1,757†	862	27	1,195	1,227
Feb.	1,593†	715	39	1,242	997
Mar.	1,669†	1,008	73	1,706	1,410
Apr.	1,558†	819	19	1,463	1,217
May	1,402†	887	24	1,180	831
June	1,314†	1,096	47	1,040	725
July	1,337†	826	32	1,076	625
Aug.	1,260†	736	27	925	601
Sept.	1,398†	836	38	788	677
Oct.	....	....	....	....	....
Nov.	....	....	....	....	....
Dec.	....	....	....	....	....
1952	18,932	11,104	277	16,794	18,489
Jan.	1,546	1,119	7	1,362	1,496
Feb.	1,517	933	26	1,471	1,923
Mar.	1,569	784	40	1,642	1,899
Apr.	1,329	1,277	21	1,476	1,941
May	1,872	1,025	5	1,596	2,027
June	1,401	975	13	1,438	1,518
July	1,182†	847	35	1,233	1,235
Aug.	2,157†	811	24	1,434	1,353
Sept.	1,565†	761	26	1,535	1,374
Oct.	1,588†	1,059	7	1,158	1,442
Nov.	1,471†	768	27	981	892
Dec.	1,735†	745	46	1,303	1,134
1951	13,048	10,333	485	15,645	16,954
1950	10,115	8,207	272	9,652	16,674
1949	7,393	6,193	256	7,295	12,647
1948	10,927	10,435	385	8,792	13,690
1947	13,677	10,822	1,169	9,719	13,034
1946	16,467	10,622	2,818	21,093	16,949
1945	20,716	8,776	2,795	21,448	
1944	30,230	6,023	3,140	15,426	
1943	30,437	4,747	2,068	4,439	
1942	60,264	5,651	2,674	8,236	
1941	35,856	4,412	1,415	4,217	
1940	13,646	2,649	1,168	2,478	

† Includes rectifier type

National Electrical Manufacturers Association

Contract Stampings Shipments

Index—1947-1949 = 100

1953						
Jan.	152	May	152	Sept.	154	
Feb.	158	June	145	Oct.	162	
Mar.	181	July	120	Nov.	....	
Apr.	158	Aug.	164	Dec.	....	
1952						
Jan.	139	May	127	Sept.	126	
Feb.	136	June	108	Oct.	139	
Mar.	130	July	90	Nov.	104	
Apr.	134	Aug.	105	Dec.	133	

YEARLY AVERAGES

1953* (9 Mos.) ... 154 1952 123

Pressed Metal Institute * Estimated

INTERNAL COMBUSTION ENGINES

(Except Automotive and Aircraft)

Factory Shipments

Type	Total Engines Produced	No. Used in Own Product	Shipped To Other Firms: Number Engines	Shipped To Other Firms: Value (thousands)
1952				
Gasoline (except outboard and miniature)	2,958,012	753,773	2,204,239	$183,366
Diesel	120,538	56,660	63,878	184,585
Outboard	337,419	.....	337,419	46,129
Gas and dual fuel	24,446	9,642	14,804	58,927
Total	3,440,415	820,075	2,620,340	$473,007
1951				
Gasoline (except outboard and miniature)	3,103,551	931,285	2,172,266	$183,877
Diesel	129,203	62,653	66,550	166,377
Outboard	291,697	.....	291,697	39,456
Gas and dual fuel	28,072	12,408	15,664	71,184
Total	3,552,523	1,006,346	2,546,177	$460,894
1950				
Gasoline and other carburetor (except outboard)	2,458,274	745,336	1,712,938	$129,816
Diesel & semi-diesel	98,955	56,048	42,907	100,482
Outboard	367,173	.....	367,173	41,037
Other	125,850	3,644	122,206	48,777
Total	3,050,252	805,028	2,245,224	$320,112

U. S. Bureau of the Census

BEARINGS IMPORTS

Ball Bearings and Parts

	lb	Value
1953		
1st Half.	644,151	$ 757,116
1952	928,940	1,453,539
1951	843,706	1,541,301
1950	85,027	156,496
1949	12,349	47,979
1948	-14,396	55,091
1947	15,973	39,426
1946	48,845	106,953
1945	54,424	84,636
1944	42,922	240,653
1943	10,416	19,659

Roller Bearings and Parts

	lb	Value
1953		
1st Half.	805,047	$1,190,000
1952	899,189	1,289,746
1951	901,351	1,244,019
1950	88,622	117,673
1949	14,464	38,955
1948	59,538	127,680
1947	40,432	67,144
1946	71,325	127,435
1945	21,455	26,381
1944	11,774	13,731
1943	7,424	8,237

Foreign Trade Division, U. S. Bureau of the Census

Transportation

METALWORKING FACTS AND FIGURES

AUTOMOBILE PRODUCTION — UNITED STATES AND CANADA

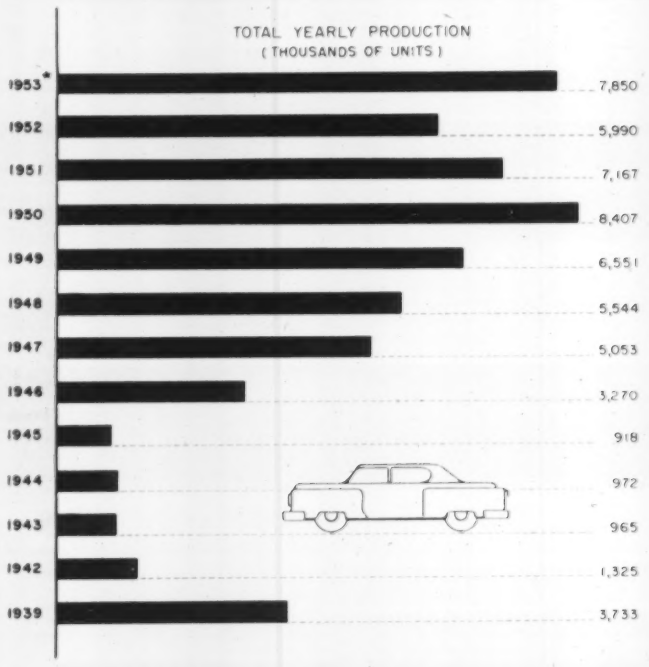
1953	Passenger Cars	Trucks	Total
Jan.	494,527	118,302	612,829
Feb.	515,959	107,835	623,794
Mar.	607,504	144,970	752,474
Apr.	638,730	143,723	782,453
May	582,838	102,553	685,391
June	626,709	87,624	714,333
July	636,140	121,455	757,595
Aug.	535,834	105,318	641,152
Sept.	502,876	102,352	605,228
Oct.	556,433	95,228	651,661
Nov.	377,067	80,795	457,862
Dec.	.....	.....	.....

1952	Passenger Cars	Trucks	Total
Jan.	304,085	120,474	424,559
Feb.	348,844	115,713	464,557
Mar.	400,441	124,583	525,024
Apr.	443,066	127,398	570,464
May	421,185	121,374	542,559
June	423,817	118,661	542,478
July	183,745	42,389	226,134
Aug.	255,927	66,828	322,755
Sept.	468,337	127,378	595,715
Oct.	508,466	148,301	656,767
Nov.	423,922	124,860	548,782
Dec.	440,274	129,441	569,715

YEARLY PRODUCTION

Year	Passenger Cars	Trucks	Total
1953*	6,500,000	1,350,000	7,850,000
1952	4,622,109	1,367,400	5,989,509
1951	5,628,433	1,538,672	7,167,105
1950	6,957,577	1,449,650	8,407,227
1949	5,321,210	1,230,093	6,551,303
1948	4,078,496	1,465,291	5,543,787
1947	3,723,383	1,329,290	5,052,673
1946	2,247,792	1,021,963	3,269,755
1945	85,654	832,017	917,671
1944	.....	972,000	972,000
1943	.....	965,400	965,400
1942	218,872	1,106,153	1,325,025
1939	2,975,165	757,553	3,732,718

Ward's Automotive Reports *Estimated



Busses

Shipments from U. S. Factories

	1953	1952	1951	1950
January	248	778	661	279
February	190	625	521	133
March	236	569	829	199
April	145	597	819	261
May	367	423	742	412
June	380	484	838	598
July	376	224	665	397
August	451	349	783	437
September	348	387	743	423
October	519	389	1,174	553
November	.....	319	833	704
December	.....	231	845	661

YEARLY TOTALS

1952	5,375	1946	10,091
1951	9,460	1945	9,500
1950	4,908	1944	5,799
1949	5,511	1943	1,613
1948	12,299	1942	8,337
1947	19,110	1941	7,626

Automobile Manufacturers Association

New Transit Equipment Delivered

	Surface Cars	Subway & Elevated Cars	Trolley Coaches	Motor Busses	Total
1953†	0	0	0	1,800	1,800
1952	19	0	224	1,749	1,992
1951	56	140	600	4,552	5,348
1950	4	199	179	2,668	3,050
1949	273	415	6 0	3,358	4,726
1948	478	248	1,430	7,009	9,165
1947	626	2	955	12,029	13,612
1946	421	0	266	6,463	7,150
1945	332	0	161	4,441	4,934
1944	284	0	60	3,807	4,151
1943	32	0	116	1,251	1,399
1942	284	0	356	7,200	7,840

† Preliminary.
American Transit Association

TRUCK TRAILERS

PRODUCTION, By Types of Trailers

	Vans	Tanks	Pole, Pipe & Logging	Platforms	Low-Bed Heavy Haulers	Dump Trailers	All Other	Converter Dollies	Trailer Chassis Only	Total Production Units	Shipments Units	Shipments Value
1953												
9 Mos.	24,426	3,508	1,316	11,664	4,071	944	26,305	1,004	2,561	75,840	74,943	$231,064,000
Jan.	2,588	338	145	1,631	296	88	232	317	223	5,852	5,674	22,843,000
Feb.	2,586	424	153	1,578	270	78	264	370	286	6,009	5,921	23,769,000
Mar.	2,823	470	202	1,667	367	107	691	102	311	6,740	6,758	26,508,000
Apr.	2,990	476	163	1,538	461	135	2,689	64	334	8,850	7,803	29,128,000
May	3,166	423	119	1,410	406	90	3,800	40	327	9,781	9,379	28,968,000
June	2,778	397	138	1,074	422	142	4,358	42	357	9,708	9,580	26,416,000
July	2,526	379	155	858	420	120	4,489	18	320	9,285	10,265	24,526,000
Aug.	2,688	353	120	860	683	105	4,697	51	205	9,703	9,741	25,013,000
Sept.	2,281	348	121	1,048	746	79	5,085†	†	198	9,906†	9,822	23,893,000
Oct.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Nov.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Dec.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1952	24,043	5,201	2,395	13,403	5,696	1,026	1,979	950	3,385	58,078	57,973	$228,378,000
Jan.	1,950	534	135	1,014	562	70	392	43	313	5,013	4,941	19,410,000
Feb.	1,873	480	149	1,072	589	58	195	20	219	4,655	4,633	18,630,000
Mar.	1,994	480	204	1,323	495	94	143	27	364	5,124	5,259	20,676,000
Apr.	1,963	477	296	1,284	603	106	104	96	369	5,298	5,308	20,126,000
May	1,854	443	218	1,375	496	101	115	226	335	5,163	5,166	19,758,000
June	1,219	403	261	1,120	468	97	113	56	292	4,029	4,027	16,445,000
July	1,281	303	223	876	404	167	115	41	263	3,673	3,934	16,656,000
Aug.	1,597	403	166	1,031	409	72	130	133	230	4,471	4,421	16,293,000
Sept.	2,280	383	191	1,007	476	75	140	93	242	4,887	4,916	19,803,000
Oct.	2,708	461	177	1,082	490	80	148	56	260	5,465	5,414	21,398,000
Nov.	2,464	396	174	911	391	62	212	48	256	4,908	4,908	19,155,000
Dec.	2,560	435	261	1,308	313	44	172	111	248	5,392	5,046	20,020,000

YEARLY TOTALS

	Production, Units	Shipments Units	Shipments Value		Production, Units	Shipments Units	Shipments Value
1952	58,078	57,973	$228,378,000	1949	33,097	34,273	$119,098,000
1951	67,384	64,691	245,315,000	1948	44,478	46,960	139,996,000
1950	64,617	65,966	229,685,000	1947	53,096	55,372	138,383,093

† Data for converter dollies included under trailer chassis only.
U. S. Bureau of the Census

Merchant Ship Construction

Steel self-propelled vessels of 2000 gross tons and over built in private U. S. yards†

Year	No.	Gross Tonnage	Year	No.	Gross Tonnage
1952	31	397,165	1945	1,067	7,663,362
1951	10	147,569	1944	1,463	11,404,404
1950	26	415,499	1943	1,661	12,499,873
1949	34	538,873	1942	724	5,392,953
1948	29	164,482	1941	95	749,105
1947	50	286,473	1940	53	444,727
1946	88	672,554	1939	28	241,052

TYPES OF VESSELS CONSTRUCTED—1952

Type	Number	Gross Tonnage
Tanker	8	127,341
Bulk Carriers	11	113,110
Passenger	1	53,329
Cargo	6	55,284
Navy Transports	3	39,957
Passenger-Railway-Ferry	1	4,300
Passenger-Auto-Ferry	1	3,844
Total	31	397,165

† On Jan. 1, 1953, 92 vessels aggregating 1,309,980 gross tons were under construction, compared with 96 vessels aggregating 1,251,190 gross tons on Jan. 1, 1952.

Shipbuilders Council of America

Uncompleted Merchant Vessels

Jan. 1, 1953

Type	Number	Gross Tonnage
Cargo	37	371,100
Tankers	55	938,880
Total	92	1,309,980

Shipbuilders Council of America

Naval Shipbuilding

Private Yards' Naval Backlog

Jan. 1, 1953

Type	Number	Displacement Tonnage
Destroyers & Destroyer Leaders	8	30,630
Aircraft Carriers	1	57,500
Submarines	2	5,140
Submarine Target & Training	2	500
Escort Vessels	3	5,250
Landing Ship Tank	14	81,004
Landing Ship Dock	4	26,000
Task Fleet Command Ship	1	13,700
Oiler	6	69,600
Ice Breaker	1	5,250
Fire Support Ship, Inshore	1	1,200
Total	43	295,774
Contracted for in 1952		
Destroyer	3	10,500
Escort Vessel	2	3,800
Submarine, Nuclear Power	1	2,570
Submarine, Target & Training	1	250
Landing Ship, Dock	4	26,000
Ice Breaker	1	5,250
Oiler	5	58,000
Fire Support Ship, Inshore	1	1,200
Total	18	107,570
Delivered in 1952		
Destroyer	1	2,420
Landing Ship, Tank	1	5,786
Net Layer	1	680
Submarine	3	4,710
Total	6	13,596

Shipbuilders Council of America

Civil Aircraft

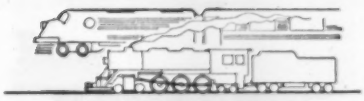
Complete Airplanes Shipped

	—Number—		—Value— (Thousands)	
	1953	1952	1953	1952
January	365	224	$17,744	$11,994
February	381	227	17,087	15,794
March	358	248	11,730	17,109
April	402	291	15,264	15,811
May	417	330	17,422	20,439
June	339	335	20,985	14,640
July	402	353	23,117	15,611
August	350	349	17,961	13,705
September	359	337	21,047	19,823
October		293		19,927
November		268		15,612
December		254		16,686

YEARLY TOTALS

	Number	Value
1952	3,509	$197,151,000
1951	2,477	88,844,000
1950	3,520	100,097,000

U. S. Bureau of the Census



New Locomotives Placed in Service by Class 1 Railroads

	Diesel-Electric	Steam	Electric	Total
1953				
10 Mos.	1,821	14	4†	1,839
Jan.	160	2	0	162
Feb.	165	2	0	167
Mar.	243	2	0	245
Apr.	268	2	0	270
May	256	1	1†	258
June	193	1	0	194
July	111	1	1†	113
Aug.	153	1	2†	156
Sept.	117	1	0	118
Oct.	155	1	0	156
Nov.	...	...	...	...
Dec.	...	...	...	...
	Diesel-Electric	Steam	Electric	Total
1952	2,389	19	1	2,415
Jan.	260	1	0	261
Feb.	224	1	1	226
Mar.	203	1	0	204
Apr.	191	1	0	192
May	264	2	0	266
June	222	2	0	224
July	119	1	0	120
Aug.	208	2	0	210
Sept.	188	2	0	190
Oct.	201	2	0	203
Nov.	146	2	0	148
Dec.	163	2	6†	171
1951	2,537	18	3	2,558
1950	2,372	12	12	2,396
1949	1,808	57	0	1,865
1948	1,397	86	4*	1,487

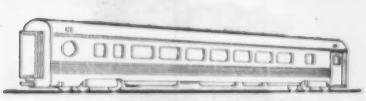
† Gas turbine electric

Association of American Railroads

Bicycles Shipped

1953*	1,750,000	1948	2,750,000
1952	1,910,000	1947	2,750,000
1951	1,800,000	1946	1,650,000
1950	1,950,000	1942-1945	None
1949	1,600,000	1939	1,220,000

* Estimated



Railroad Passenger Car Shipments

Number of Cars

	1953	1952	1951	1950	1949
Jan.	15	8	26	61	91
Feb.	17	21	19	64	80
Mar.	39	4	26	87	76
Apr.	37	12	29	82	85
May	27	2	23	113	95
June	26	13	38	106	98
July	37	8	19	94	69
Aug.	42	5	14	104	70
Sept.	34	13	25	70	94
Oct.	...	11	22	71	90
Nov.	...	11	45	58	85
Dec.	...	20	25	54	80

MONTHLY AVERAGES

1952	11	1946	114	1940	24
1951	26	1945	78	1939	23
1950	80	1944	84	1938	36
1949	84	1943	59	1937	52
1948	79	1942	36	1936	16
1947	74	1941	30	1935	17

American Railway Car Institute

Freight Cars Ordered

Domestic

	1953	1952	1951	1950	1949
Jan.	5,536	5,348	26,233	9,380	1,638
Feb.	2,284	6,047	14,093	9,065	332
Mar.	3,379	5,833	10,611	6,201	199
Apr.	2,432	639	6,229	3,298	30
May	1,651	2,502	4,264	11,635	589
June	1,463	2,385	6,040	2,095	153
July	1,632	1,536	2,401	30,065	408
Aug.	3,913	4,558	1,781	23,832	185
Sept.	3,914	3,628	8,992	25,086	123
Oct.	1,765	1,423	3,175	21,306	201
Nov.	2,860	2,878	6,746	10,423	1,145
Dec.	...	1,159	3,309	3,306	1,220
Total	37,436	93,874	155,692	6,223	

YEARLY TOTALS

1948	92,775	1947	120,163

American Railway Car Institute

FREIGHT CAR SHIPMENTS

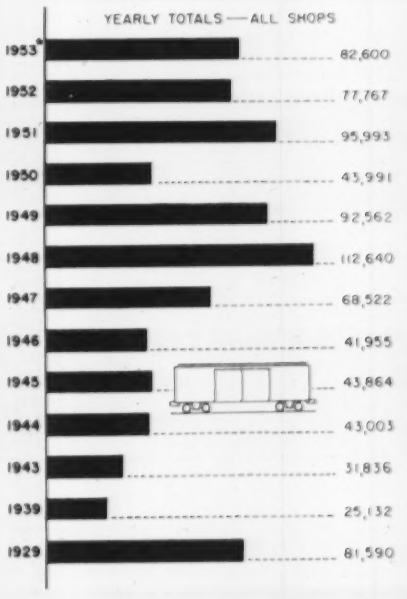
Domestic—Number of Cars

1953	Car-Builders	Railroad Shops	Total No. Cars
Jan.	5,972	2,009	7,981
Feb.	6,030	1,717	7,747
Mar.	4,952	1,727	6,679
Apr.	4,737	2,102	6,839
May	3,925	2,657	6,582
June	3,559	2,904	6,463
July	4,196	2,174	6,370
Aug.	3,368	2,189	5,557
Sept.	3,468	2,238	5,706
Oct.	5,552	3,175	8,727
Nov.	3,879	2,258	6,137
Dec.	....	....	....
11 Mos.	49,638	25,150	74,788

1952	Car-Builders	Railroad Shops	Total No. Cars
Jan.	6,081	2,561	8,642
Feb.	5,494	1,889	7,383
Mar.	5,838	2,321	8,159
Apr.	5,204	2,199	7,403
May	4,765	2,092	6,857
June	4,848	1,563	6,411
July	3,860	1,542	5,402
Aug.	2,853	1,684	4,537
Sept.	1,879	1,883	3,762
Oct.	2,963	2,474	5,437
Nov.	4,032	1,897	5,929
Dec.	5,769	2,076	7,845
Total	53,586	24,181	77,767

American Railway Car Institute

* Estimated



Appliances

METALWORKING FACTS AND FIGURES

Floor and Wall Furnaces

Factory Shipments

	1953 Number of Units	1953 Value, Thousands of Dollars	1952 Number of Units	1952 Value, Thousands of Dollars
Jan.	38,160	2,110	31,983	1,839
Feb.	34,106	1,959	32,192	1,954
Mar.	39,690	2,238	29,146	1,793
Apr.	43,609	2,577	30,486	1,827
May	37,848	2,296	35,473	2,143
June	36,820	2,416	37,172	2,303
July	50,465	3,366	49,578	3,155
Aug.	57,571	3,812	59,687	3,876
Sept.	64,721	4,319	70,990	4,636
Oct.	.....	.....	72,640	4,821
Nov.	.....	.....	54,254	3,346
Dec.	.....	.....	44,195	2,690

YEARLY TOTALS

	Number of Units	Value, Thousands of Dollars
1952	547,796	34,383
1951	507,283	30,601
1950	686,395	39,753

U. S. Bureau of the Census

Oil Burners

Shipments—Burners and Units

	1953 Resi-dential	1953 Com'l, Indus'l	1952 Resi-dential	1952 Com'l, Indus'l
Jan.	46,039	2,987	42,735	2,680
Feb.	42,116	3,229	35,828	2,659
Mar.	53,408	2,928	38,282	2,454
Apr.	51,097	2,807	42,435	2,510
May	61,246	2,927	49,426	2,821
June	47,508	3,436	55,144	2,650
July	52,375	3,367	63,658	3,419
Aug.	63,367	3,764	81,721	2,929
Sept.	66,111	3,796	100,817	3,311
Oct.	.....	.....	115,188	4,213
Nov.	.....	.....	69,560	3,324
Dec.	.....	.....	49,825	3,447
Total	.....	.....	744,619	36,417

YEARLY TOTALS

	Resi-dential	Com'l, Indus'l		Resi-dential	Com'l, Indus'l
1951	661,251	40,565	1943	27,956†	44,602
1950	879,922	33,477	1942	82,357†	48,674
1949	569,445	24,465	1941	271,673†	32,196
1948	392,625	27,043	1940	247,633†	16,569
1947	1,078,576	48,776	1939	201,735†	13,295
1946	499,009	37,306	1938	129,323†	9,888
1945	139,611	30,750	1937	177,675†	15,505
1944	45,752†	31,329	1936	182,130†	14,747

† Includes water heating units
U. S. Bureau of the Census

Mechanical Stokers

Factory Sales—Number of Units

	1953 Small†	1953 Large†	1952 Small†	1952 Large†
Jan.	957	204	1,156	332
Feb.	691	179	1,028	232
Mar.	725	154	879	222
Apr.	865	227	946	244
May	774	277	1,019	273
June	.....	.....	1,544	349
July	.....	.....	1,424	493
Aug.	.....	.....	2,376	498
Sept.	.....	.....	2,899	506
Oct.	.....	.....	2,789	495
Nov.	.....	.....	1,639	334
Dec.	.....	.....	1,102	270

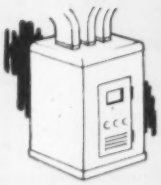
YEARLY TOTALS

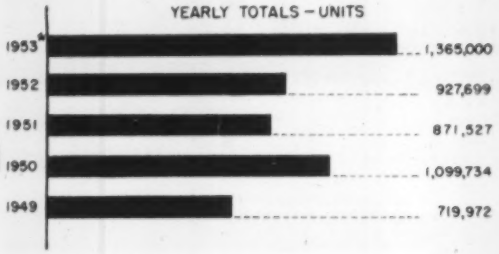
	Small†	Large†		Small†	Large†
1952	18,801	4,246	1946	181,223	9,695
1951	19,074	5,017	1945	119,079	11,745
1950	19,635	5,402	1944	31,603	11,355
1949	29,311	5,949	1943	17,765	15,074
1948	77,220	8,938	1942	79,062	8,938
1947	61,596	7,312	1941	182,956	9,491

† Small consists of classes 1 and 2 as defined by U. S. Bureau of the Census and large consists of classes 3, 4 and 5. After May, 1953, figures are available on annual basis only.

WARM AIR FURNACES

(Cast Iron and Steel)





SHIPMENTS

	1953 Number of Units	1953 Value, Thousands of Dollars	1952 Number of Units	1952 Value, Thousands of Dollars
Jan.	57,486	11,677	51,717	10,714
Feb.	55,368	10,879	50,607	10,051
Mar.	63,713	12,933	53,506	10,857
Apr.	67,543	13,476	53,219	10,502
May	70,814	14,156	60,711	11,886
June	92,294	17,975	71,927	14,359
July	90,953	17,817	79,208	15,855
Aug.	109,172	22,040	106,354	21,505
Sept.	126,181	26,029	117,238	23,933
Oct.	.....	.....	127,691	25,917
Nov.	.....	.....	90,639	18,812
Dec.	.....	.....	64,882	13,596

Yearly Totals	Number of Units	Value, in dollars
1952	927,699	187,987,000
1951	871,527	180,848,000
1950	1,099,734	205,484,000
1949	719,972	130,548,000
1948	776,548	136,936,932
1947	850,783	141,943,102
1946	699,058	88,016,228

U. S. Bureau of the Census

* Estimated

Forced Air Furnaces

Shipments—Number of Units

	Solid Fuel	Oil	Gas	Total
1953				
9 Mos.	12,880	290,148	335,280	638,308
Jan.	791	21,131	26,731	48,653
Feb.	639	20,726	26,136	47,501
Mar.	583	26,568	28,876	56,027
Apr.	642	25,385	32,878	58,905
May	1,047	26,708	33,990	61,745
June	1,589	34,585	43,607	79,781
July	1,998	36,369	41,866	80,233
Aug.	2,699	45,125	47,867	95,691
Sept.	2,892	53,551	53,329	109,772
Oct.	.....	.....	.....	.....
Nov.	.....	.....	.....	.....
Dec.	.....	.....	.....	.....
1952	21,262	345,433	398,889	765,584
Jan.	1,135	20,090	21,948	43,173
Feb.	944	18,845	21,176	40,965
Mar.	1,371	20,557	22,859	44,787
Apr.	979	19,464	24,387	44,830
May	1,260	20,225	29,274	50,759
June	1,250	26,555	32,087	59,892
July	1,813	29,652	34,167	65,632
Aug.	2,713	38,633	45,574	86,920
Sept.	2,632	43,562	47,701	93,895
Oct.	3,789	49,046	50,944	103,779
Nov.	2,306	34,066	39,251	75,623
Dec.	1,070	24,738	29,521	55,329
1951	27,505	313,453	324,339	665,297
1950	30,145	344,181	465,327	839,653
1949	32,827	204,256	212,123	449,206
1948	77,958	179,479	143,536	400,973

U. S. Bureau of the Census

Gravity Air-Flow Furnaces

Shipments—Number of Units

	Solid Fuel	Oil	Gas	Total
1953				
9 Mos.	38,602	14,181	43,727	95,910
Jan.	3,460	970	4,695	9,125
Feb.	3,252	936	3,679	7,867
Mar.	3,431	785	3,872	8,088
Apr.	2,829	1,427	4,382	8,638
May	3,715	1,589	3,765	9,069
June	5,095	1,711	5,707	12,513
July	3,698	1,949	5,073	10,720
Aug.	5,249	2,085	6,147	13,481
Sept.	7,273	2,729	6,407	16,409
Oct.	.....	.....	.....	.....
Nov.	.....	.....	.....	.....
Dec.	.....	.....	.....	.....
1952	79,231	18,033	64,851	162,115
Jan.	4,100	919	3,525	8,544
Feb.	4,312	1,144	4,186	9,642
Mar.	3,664	934	4,121	8,719
Apr.	3,361	1,076	3,952	8,389
May	4,695	939	4,318	9,952
June	5,154	1,190	5,691	12,035
July	6,765	1,448	5,363	13,576
Aug.	10,754	2,181	6,499	19,434
Sept.	12,882	3,016	7,445	23,343
Oct.	12,563	2,444	8,965	23,912
Nov.	7,228	1,317	6,471	15,016
Dec.	3,753	1,425	4,375	9,553
1951	119,368	18,330	68,532	206,230
1950	107,585	18,003	134,493	260,081
1949	168,981	15,048	86,737	270,766
1948	319,958	10,997	44,620	375,575

U. S. Bureau of the Census

Cast Iron Boilers, Radiators and Convectors

Shipments

Boilers

	Thousands of Pounds		Value, Thousands of Dollars	
	1953†	1952	1953†	1952
Jan.	11,552	11,318	2,663	2,602
Feb.	13,280	10,212	3,208	2,430
Mar.	10,990	9,161	2,679	2,329
Apr.	9,286	9,480	2,337	2,409
May	12,831	13,346	3,137	3,194
June	.....	16,962	....	3,968
July	.....	17,285	....	3,988
Aug.	.....	24,037	....	5,538
Sept.	.....	29,455	....	6,611
Oct.	.....	33,552	....	7,683
Nov.	.....	23,088	....	5,345
Dec.	.....	14,088	....	3,038

YEARLY TOTALS

	Thousands of Pounds	Value, Thousands of Dollars
1952	211,984	49,165
1951	210,208	47,594
1950	267,911	54,676
1949	206,296	40,525
1948	263,303	43,756

† Monthly data discontinued after May, 1953

Radiation †

	Thousands of sq ft		Value, Thousands of Dollars	
	1953‡	1952	1953‡	1952
Jan.	2,631	2,784	1,745	1,783
Feb.	2,297	2,226	1,550	1,484
Mar.	2,435	2,074	1,652	1,359
Apr.	1,740	1,760	1,161	1,155
May	1,821	2,145	1,199	1,409
June	2,477	2,925	....	1,904
July	2,591	2,915	....	1,910
Aug.	3,345	3,974	....	2,592
Sept.	.....	4,729	....	3,121
Oct.	.....	4,962	....	3,282
Nov.	.....	3,814	....	2,551
Dec.	.....	2,590	....	1,791

YEARLY TOTALS

	Thousands of sq ft	Value, Thousands of Dollars
1952	36,898	24,341
1951	42,512	26,396
1950	48,175	26,436
1949	35,888	19,936
1948	60,333	31,426

†Includes radiators and convectors
‡ Monthly data discontinued after May, 1953
U. S. Bureau of the Census

Domestic Heating Stoves

Shipments—1953

	Coal, Wood	Gas	Oil	Total
Jan.	12,061	58,193	76,152	146,406
Feb.	11,735	58,579	52,031	122,345
Mar.	16,295	74,282	51,817	142,394
Apr.	20,782	72,366	44,475	137,623
May	25,503†	78,136	51,326	154,965
June	27,617	116,059	72,809	276,485
July	47,056	153,104	97,649	297,809
Aug.	51,841	221,532	122,895	396,268
Sept.	67,332	239,210	172,352	478,894
Oct.	.....	.....	.....	.....

YEARLY TOTALS

	Coal, Wood	Gas	Oil	Total
1952..	904,242	1,786,360	1,113,600	3,804,202
1951..	1,047,627	1,896,619	1,238,840	4,183,086
1950..	888,515	2,023,278	1,320,616	4,232,409
1949..	955,571	1,441,335	1,265,865	3,662,771

† Sheet metal airtight type excluded after May, 1952
U. S. Bureau of the Census

Coal and Wood Cooking Stoves

Shipments—Units

	1953	1952	1951	1950
Jan.	8,723	10,116	12,061	10,453
Feb.	8,089	10,204	10,864	11,987
Mar.	8,125	9,241	12,639	14,426
Apr.	7,420	8,091	8,152	12,055
May	5,075	6,883	7,837	8,697
June	5,435	6,318	9,126	8,847
July	5,796	7,696	6,238	11,177
Aug.	7,006	9,437	9,953	21,108
Sept.	9,636	9,655	11,666	16,220
Oct.	.....	10,523	11,255	14,890
Nov.	.....	8,411	11,474	11,251
Dec.	.....	8,911	9,435	10,051

YEARLY TOTALS

1952...105,486	1950...151,162	1948...295,527	
1951...120,700	1949...169,928	1947...449,356	

U. S. Bureau of the Census

Gas Water Heaters

Shipments—Underfired and Sidearm Types

	1953 Units	1953 Value, Thousands of Dollars	1952 Units	1952 Value, Thousands of Dollars
Jan.	191,602	9,440	154,944	7,474
Feb.	196,721	9,830	153,678	7,367
Mar.	211,365	10,594	160,068	7,902
Apr.	211,405	10,700	160,174	7,692
May	185,873†	9,574	163,568	7,728
June	172,243	9,123	165,766	7,965
July	170,356	9,066	138,238	6,314
Aug.	159,730	8,694	168,071	7,979
Sept.	171,779	9,710	179,897	8,701
Oct.	.....	.....	192,831	9,103
Nov.	.....	.....	174,030	8,354
Dec.	.....	.....	184,269	8,968

YEARLY TOTALS

	Units	Value
1952	1,995,534	$ 95,547,000
1951	2,074,410	101,778,000
1950	2,562,973	111,624,000
1949	1,656,385	74,106,000

U. S. Bureau of the Census

Plumbing Fixtures

Shipments—Value in Thousands of Dollars

VITREOUS CHINA AND GLAZED EARTHENWARE

Qtr.	1953	1952	1951	1950
1st	$22,169	$19,212	$31,061	$21,202
2nd	22,089	21,121	30,382	23,723
3rd	.....	23,657	26,066	28,217
4th	.....	21,240	20,734	29,190
Total	.....	$85,230	$108,243	$102,332

METAL—EXCLUSIVE OF FITTINGS

Qtr.	1953	1952	1951	1950
1st	$45,241	$39,174	$64,457	$42,902
2nd	47,661	43,819	57,084	49,380
3rd	.....	48,886	41,754	57,587
4th	.....	44,257	39,235	62,806
Total	.....	$176,136	$202,530	$212,675

YEARLY TOTALS

VITREOUS CHINA AND GLAZED EARTHENWARE

1949..... $77,159 1948..... $84,001

METAL—EXCLUSIVE OF FITTINGS

1949..... $139,227 1948..... $171,163

U. S. Bureau of the Census

Oil Cooking Stoves

(Kerosene, Gasoline and Fuel Oil)

Shipments—Units

	1953	1952	1951	1950
Jan.	8,347	8,105	16,445	14,305
Feb.	10,081	11,229	15,311	15,739
Mar.	10,429	10,281	14,752	18,663
Apr.	10,492	9,188	9,248	11,862
May	10,726	9,783	8,720	13,904
June	7,146	10,433	9,449	16,564
July	6,180	8,159	8,430	14,682
Aug.	9,231	9,438	8,425	22,153
Sept.	8,363	11,485	9,720	18,670
Oct.	.....	13,153	13,090	13,952
Nov.	.....	9,173	11,376	13,544
Dec.	.....	9,501	7,867	16,738

YEARLY TOTALS

1952..119,928	1950..190,776	1948..466,777	
1951..132,833	1949..185,939	1947..559,579	

U. S. Bureau of the Census

Electric Lamps (Bulbs)

Manufacturers' Shipments

Value in Thousands of Dollars

	Domestic	Export	Total
1953—9 Mos.	$199,378	$8,320	$207,698
1952.....	231,539	8,206	239,745
1951.....	252,465	11,670	264,135
1950.....	233,860	9,297	243,157
1949.....	192,638	7,240	199,878
1948.....	199,291	8,879	208,170
1947.....	183,789	10,600	194,389
1946.....	136,281	7,584	143,865

PRODUCTION

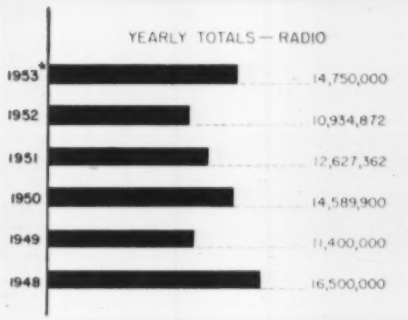
Thousands of Lamps

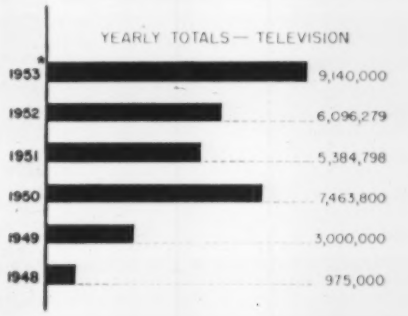
1951.....	2,341,154	1949.....	1,832,423
1950.....	2,084,607	1948.....	1,976,674

U. S. Bureau of the Census

RADIO AND TELEVISION RECEIVERS

Number Produced





RADIOS

	Home	Portable	Auto	Clock
1953				
9 Mos.	3,061,181	1,375,308	4,149,812	1,562,862
Jan.	361,921	93,962	447,667	189,592
Feb.	402,742	87,711	491,062	210,924
Mar.	442,101	177,656	654,367	275,079
Apr.	286,974	201,476	483,092	187,394
May	278,156	204,065	497,379	129,391
June	287,724	239,189	505,774	131,144
July	172,197	78,434	336,208	87,620
Aug.	299,939	145,460	376,937	169,301
Sept.	529,427	147,355	357,326	182,417
Oct.	.....	.....	.....	.....
Nov.	.....	.....	.....	.....
Dec.	.....	.....	.....	.....

TOTAL RADIOS PRODUCED

1953—9 Mos.			10,149,163
Jan.	1,093,142	July	674,459
Feb.	1,192,439	Aug.	991,637
Mar.	1,549,203	Sept.	1,216,525
Apr.	1,158,936	Oct.	.....
May	1,108,991	Nov.	.....
June	1,163,831	Dec.	.....

YEARLY TOTALS

	Units	Value (Manufacturers')
1952	10,934,572	$249,847,000
1951	12,627,362	315,936,597
1950	14,589,900	375,000,000
1949	11,400,000	310,000,000
1948	16,500,000	525,000,000

TELEVISION

1953—9 Mos.			5,524,370
Jan.	719,234	July	316,289
Feb.	730,597	Aug.	603,760
Mar.	810,112	Sept.	770,065
Apr.	567,878	Oct.	.....
May	481,936	Nov.	.....
June	524,479	Dec.	.....

YEARLY TOTALS

	Units	Value (Manufacturers')
1952	6,096,279	$1,049,000,000
1951	5,384,798	956,956,300
1950	7,463,800	1,350,000,000
1949	3,000,000	580,000,000
1948	975,000	230,000,000

*Estimated.
Radio-Electronics-Television Mfrs. Assn.

Appliances

METALWORKING FACTS AND FIGURES

Electric Disc Stoves and Hot Plates

(1650 Watts or Less)
Sales Billed—Units

	1953	1952	1951	1950
Jan.		21,178	35,776	27,099
Feb.		25,435	40,188	30,707
Mar.		25,617	60,294	45,609
Apr.		21,839	56,734	35,712
May		17,368	25,304	31,283
June		20,503	18,089	38,665
1st Half	253,534			
July	42,137	17,323	12,862	23,379
Aug.	63,099	53,945	24,366	60,695
Sept.	53,426	35,811	19,754	57,768
Oct.		30,979	20,229	45,660
Nov.		37,271	24,124	36,796
Dec.		29,569	15,047	50,273
Total		336,838	352,758	483,556

National Electrical Manufacturers Association

Electric Air Heaters, Portable

Sales Billed—Units

CONVECTOR AND RADIANT

	1953	1952	1951	1950
Jan.		3,885	11,274	5,940
Feb.		2,433	15,825	3,642
Mar.		2,167	17,292	6,744
Apr.		1,951	7,872	860
May		2,232	5,364	1,523
June		2,524	8,018	7,554
1st Half	17,330			
July	10,018	7,955	5,469	13,400
Aug.	23,723	27,561	7,143	40,300
Sept.	41,113	13,943	17,233	42,083
Oct.		15,854	31,365	65,104
Nov.		17,695	16,478	26,858
Dec.		11,485	20,782	15,612
Total		109,388	164,115	229,620

FAN FORCED AND FAN AND HEATER COMBINATION

	1953	1952	1951
Jan.		18,247	36,626
Feb.		8,504	37,628
Mar.		8,674	20,856
Apr.		2,366	8,526
May		9,761	3,051
June		11,352	3,046
1st Half	104,460		
July	59,771	34,399	14,654
Aug.	90,640	50,905	35,015
Sept.	101,281	57,147	44,070
Oct.		80,922	59,117
Nov.		58,436	54,684
Dec.		36,407	32,064
Total		377,120	349,337

National Electrical Manufacturers Association

Electric Coffee Makers, Pots & Urns

Vacuum (glass & metal) and Percolators
Sales Billed—Units

	1953	1952	1951	1950
Jan.		49,927	74,886	59,096
Feb.		88,678	119,689	53,961
Mar.		123,320	147,935	80,977
Apr.		58,158	82,672	80,979
May		69,769	60,013	69,877
June		53,503	109,168	88,608
1st Half	1,344,883			
July	227,277	59,757	48,025	63,013
Aug.	322,324	91,869	85,702	128,605
Sept.	388,130	157,884	82,193	171,117
Oct.		177,306	84,603	150,799
Nov.		164,670	78,964	137,806
Dec.		170,556	57,906	111,800
Total		1,265,397	1,031,756	1,196,638

National Electrical Manufacturers Association

Electric Grills and Waffle Irons

Sales Billed—Units

Sandwich Grills & Griddles & Combination Grills & Waffle Irons

	1953	1952	1951
Jan.		25,004	93,409
Feb.		23,821	110,702
Mar.		28,781	132,221
Apr.		21,879	98,463
May		31,974	48,964
June		41,382	37,505
1st Half	96,709†		
July	8,513†	33,606	42,186
Aug.	18,939†	105,854	48,767
Sept.	22,296†	106,947	100,009
Oct.		110,918	107,384
Nov.		89,422	58,103
Dec.		127,319	45,682
Total		746,907	923,395

† Excludes combination grills

WAFFLE IRONS

	1953	1952	1951
Jan.		6,523	25,589
Feb.		8,037	28,136
Mar.		5,570	28,782
Apr.		4,350	31,805
May		3,210	21,287
June		3,100	10,697
1st Half	285,841†		
July	99,541†	7,493	7,198
Aug.	127,961†	13,915	18,915
Sept.	132,840†	15,484	17,703
Oct.		8,993	23,275
Nov.		14,890	17,219
Dec.		17,543	10,398
Total		109,108	241,004

† Includes combination grills
National Electrical Manufacturers Association

Electric Freezers

(Home and Farm)
Sales Billed—Units

	1953	1952	1951	1950
Jan.	85,239	44,147	71,708	31,948
Feb.	83,661	50,127	63,996	39,193
Mar.	111,888	52,344	77,937	51,970
Apr.	89,031	49,422	64,336	42,480
May	70,279	71,774	56,623	36,940
June	62,375	98,871	63,322	52,825
July	66,712	89,767	56,815	76,699
Aug.	59,497	77,873	68,587	76,753
Sept.	58,140	83,942	67,968	62,019
Oct.		77,901	60,451	63,455
Nov.		57,617	46,933	49,851
Dec.		60,301	39,652	61,018
Total		814,086	738,328	645,151

National Electrical Manufacturers Association

Electric Broilers

Sales Billed—Units

	1952†	1951	1950	1949
Jan.	5,232	7,245	4,438	7,011
Feb.	6,950	8,082	3,320	5,792
Mar.	6,181	6,981	4,097	4,650
Apr.	4,770	6,088	4,178	3,275
May	5,477	2,253	3,129	2,619
June	5,705	5,735	4,364	2,617
July	7,383	1,727	5,374	1,559
Aug.	8,465	3,560	10,128	1,843
Sept.	5,329	5,809	12,756	2,097
Oct.	10,522	7,494	8,342	7,433
Nov.	11,149	8,600	10,661	5,919
Dec.	8,060	7,510	6,962	3,633
Total	85,223	71,084	77,749	48,448

† Not available for 1953.
National Electrical Manufacturers Association

Electric Toasters

Sales Billed—Units

AUTOMATIC

	1953	1952	1951	1950
Jan.		118,624	292,423	244,345
Feb.		141,851	319,129	264,111
Mar.		99,540	364,745	226,774
Apr.		63,654	263,153	192,567
May		74,817	209,649	209,337
June		82,566	157,077	151,330
1st Half	796,766			
July	206,686	210,207	95,940	245,111
Aug.	250,421	289,303	183,874	440,078
Sept.	290,968	269,262	219,698	479,726
Oct.		285,981	237,091	358,169
Nov.		231,390	174,757	372,356
Dec.		132,235	112,560	335,054
Total		1,999,430	2,630,096	3,518,958

NONAUTOMATIC

	1953	1952	1951	1950
Jan.		1,783	8,641	12,407
Feb.		2,992	10,888	11,282
Mar.		1,234	7,265	10,350
Apr.		1,218	3,867	5,892
May		1,130	5,260	4,942
June		927	3,719	5,629
1st Half	129,119			
July	27,635	4,118	3,099	8,720
Aug.	27,350	9,824	9,440	35,791
Sept.	35,537	3,592	12,823	26,751
Oct.		8,003	11,527	33,333
Nov.		2,753	10,746	18,174
Dec.		2,599	5,018	22,901
Total		40,173	92,293	196,172

National Electrical Manufacturers Association

Electric Roasters

Sales Billed—Units

	1952†	1951	1950	1949
Jan.	28,444	33,885	25,698	29,999
Feb.	23,571	51,119	36,507	40,587
Mar.	28,501	55,148	23,204	21,849
Apr.	32,963	35,875	20,224	11,371
May	32,172	27,360	19,300	10,123
June	23,874	21,013	25,741	15,022
July	36,875	15,015	36,972	11,480
Aug.	48,382	40,494	41,792	20,918
Sept.	44,984	34,138	38,785	41,285
Oct.	43,036	39,572	39,271	43,540
Nov.	36,615	36,800	48,084	44,255
Dec.	42,465	38,776	38,096	36,960
Total	421,882	429,285	393,674	327,389

† Not available for 1953.
National Electrical Manufacturers Association

Standard-Size Ironers

Factory Sales—Units

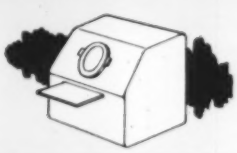
	1953	1952	1951	1950
Jan.	24,395	15,636	24,600	20,300
Feb.	22,588	17,630	32,400	27,600
Mar.	16,066	13,913	34,700	37,800
Apr.	14,080	8,938	23,700	31,600
May	9,323	12,652	24,200	27,400
June	12,529	17,654	24,500	27,100
July	9,626	15,025	11,100	25,100
Aug.	8,067	16,477	17,200	42,700
Sept.	9,113	22,492	18,300	41,400
Oct.	11,666	25,204	29,800	47,500
Nov.		19,724	20,500	41,900
Dec.		16,798	16,900	38,800

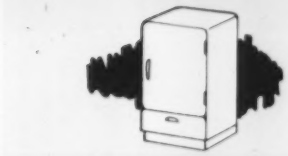
YEARLY TOTALS

1952	202,143	1947	599,258
1951	277,900	1946	124,616
1950	409,200	1945–43†	None
1949	307,345	1942†	66,090
1948	476,276	1939	127,093

† Civilian production stopped from mid-1942 through 1945.

American Home Laundry Manufacturers' Association.





WASHERS

Sales Billed—Units

	1953	1952	1951
Jan.	277,309	213,998	321,092
Feb.	326,604	255,864	341,328
Mar.	345,986	248,431	368,455
Apr.	288,474	217,211	292,193
May	286,515	213,668	253,942
June	304,086	274,457	253,119
July	228,268	207,593	139,799
Aug.	291,260	254,537	239,081
Sept.	340,532	283,732	313,756
Oct.	310,867	327,814	297,210
Nov.	.....	293,079	262,484
Dec.	.....	310,661	218,664

YEARLY TOTALS

1952	3,101,045	1949	3,033,106
1951	3,301,123	1948	4,317,183
1950	4,289,931	1947	3,783,632

American Home Laundry Manufacturers' Association

ELECTRIC REFRIGERATORS

Domestic Sales—Units

	1953	1952	1951
Jan.	325,186	260,259	465,903
Feb.	351,696	259,838	403,035
Mar.	368,496	276,972	558,503
Apr.	327,629	225,994	409,887
May	275,392	217,617	309,722
June	302,095	324,885	261,298
July	298,838	333,877	163,922
Aug.	214,181	250,224	165,309
Sept.	212,823	230,111	193,929
Oct.	.....	207,065	191,519
Nov.	.....	256,530	147,394
Dec.	.....	248,506	195,403

YEARLY TOTALS

1952	3,091,878	1946	1,811,326
1951	3,465,824	1945	267,061
1950	5,637,108	1944	40,034
1949	3,704,269	1943	156,697
1948	3,976,091	1942	378,725
1947	2,994,297	1939	1,809,445

National Electrical Manufacturers Assn.

* Estimated

HOUSEHOLD GAS RANGES

Shipments—Units

	1953	1952	1951
Jan.	166,408	161,784	250,571
Feb.	183,673	163,286	244,568
Mar.	204,924	181,470	279,263
Apr.	214,891	177,418	217,024
May	175,034	157,911	171,742
June	160,390	170,126	122,647
July	153,445	148,803	110,509
Aug.	180,775	170,822	158,886
Sept.	198,127	188,513	173,402
Oct.	.....	227,961	195,260
Nov.	.....	178,915	182,963
Dec.	.....	172,870	143,831

YEARLY TOTALS

1952	2,099,879	1949	1,994,203
1951	2,250,656	1948	2,579,265
1950	2,893,681	1947	2,216,609

U. S. Bureau of the Census

Automatic Tumbler Dryers

Factory Sales—Units

	1953	1952	1951	1950
Jan.	62,260	45,121	31,935	19,495
Feb.	57,136	44,540	36,851	19,389
Mar.	49,593	41,161	44,020	27,125
Apr.	28,556	36,109	32,960	25,140
May	32,867	28,812	32,292	16,122
June	32,789	31,720	39,908	20,568
July	33,296	33,858	26,268	23,588
Aug.	70,774	53,376	40,191	32,318
Sept.	86,461	71,516	43,752	31,399
Oct.	81,839	83,510	59,299	28,882
Nov.	.....	74,370	52,499	33,044
Dec.	.....	70,584	46,779	41,418
Total	.....	614,677	486,754	318,488

American Home Laundry Manufacturers' Association

Household Electric Ranges

Domestic Sales—Units

	1953	1952	1951
Jan.	108,145	79,982	130,316
Feb.	112,512	63,063	121,585
Mar.	127,545	93,225	159,865
Apr.	115,759	69,149	118,823
May	110,766	68,117	106,685
June	109,943	86,847	106,589
July	77,836	83,465	60,530
Aug.	71,893	74,853	64,042
Sept.	81,888	62,404	93,551
Oct.	.....	63,143	109,043
Nov.	.....	72,982	101,476
Dec.	.....	84,630	72,140

YEARLY TOTALS

1952	901,860	1946	542,168
1951	1,244,645	1945	146,046
1950	1,580,613	1944	42,712
1949	887,953	1943	8,480
1948	1,341,497	1942	161,312
1947	1,016,536	1939	296,846

National Electrical Manufacturers Association

Standard Vacuum Cleaners

Sales Billed—Units

	1953	1952	1951
Jan.	255,886	230,226	282,305
Feb.	246,007	235,936	261,572
Mar.	329,294	290,092	290,242
Apr.	268,548	217,169	227,216
May	252,404	216,969	201,983
June	197,506	206,939	194,548
July	159,446	188,715	161,002
Aug.	188,536	222,413	191,299
Sept.	227,253	237,541	210,086
Oct.	249,383	292,474	259,469
Nov.	.....	254,297	219,119
Dec.	.....	249,032	230,263

YEARLY TOTALS

1952	2,841,803	1949	2,886,514
1951	2,729,104	1948	3,368,108
1950	3,529,412	1947	3,800,687

Vacuum Cleaner Manufacturers Association

Steel Kitchen Cabinets

(including steel cabinet sink units)
(Factory Sales)

	Units	Retail Value
1953	3,441,000	$178,000,000
1952	2,970,000	154,000,000
1951	2,871,000	128,850,500
1950	2,969,000	125,848,500
1949	2,658,000	105,000,000
1948	3,500,000	138,000,000

Steel Kitchen Cabinet Manufacturers Assn. Inc.

Deep Fat Fryers

Sales Billed—Units

1953			
January	.....	July	36,696
February	.....	August	58,290
March	.....	September	67,681
April	.....	October	.....
May	.....	November	.....
June	.....	December	.....
1st Half	145,380	Total	.....

National Electrical Manufacturers Association

Electric Flat Irons

Sales Billed—Units

	1953	1952	1951
January	.....	282,598	379,810
February	.....	421,157	536,684
March	.....	441,172	635,350
April	.....	241,028	645,571
May	.....	272,712	561,284
June	.....	336,645	571,741
1st Half	2,876,899	.....	.....
July	329,793	403,283	293,867
August	561,433	626,711	400,494
September	970,481	537,553	645,620
October	.....	594,392	387,323
November	.....	509,413	423,621
December	.....	588,380	531,362
Total	.....	5,255,244	6,012,727

YEARLY TOTALS

1950	5,866,575	1949	3,935,185

National Electrical Manufacturers Association

Electric Water Heaters

Domestic Unit Sales of Storage Tank Type

	1953	1952	1951
January	47,623	37,178	73,067
February	48,408	42,677	58,720
March	60,802	45,507	82,830
April	60,879	44,935	69,524
May	54,606	42,795	67,805
June	51,419	49,830	55,769
July	49,194	45,490	43,285
August	44,966	43,580	42,970
September	53,411	46,365	40,432
October	.....	54,668	51,533
November	.....	46,417	40,463
December	.....	46,865	35,061

YEARLY TOTALS

1952	546,307	1946	399,826
1951	661,459	1945	129,722
1950	798,687	1944	31,527
1949	508,814	1943	24,720
1948	706,389	1942	80,986
1947	817,717	1939	80,777

National Electrical Manufacturers Association

FARM MACHINERY AND EQUIPMENT

Manufacturers' Shipments

U. S. Bureau of the Census

Complete Units—Totals

	Total	Domestic	Export
1952	$1,519,765,000	$1,333,407,000	$186,358,000
1951	1,758,656,000	1,540,856,000	217,800,000
1950	1,437,824,000	1,258,341,000	179,483,000
1949	1,424,068,000	1,219,220,000	204,848,000
1948	1,334,345,000	1,162,306,000	172,039,000
1947	975,988,126	852,037,940	123,950,186
1946	622,673,570	557,568,157	65,105,413
1945	490,504,558	426,552,593	63,951,965

COMPLETE UNITS—BY PRODUCT GROUPS

Plows and Listers

	Total	Domestic	Export
1952	$60,800,000	$51,133,000	$9,667,000
1951	75,219,000	63,226,000	11,993,000
1950	67,487,000	56,947,000	10,540,000
1949	66,694,000	52,812,000	13,882,000
1948	67,353,000	57,332,000	10,021,000
1947	52,596,324	45,439,275	7,157,049
1946	30,585,670	26,968,841	3,616,829
1945	22,116,982	18,926,438	3,190,544

Harrows, Rollers, Pulverizers, Stalk Cutters

1952	$70,749,000	$65,618,000	$5,131,000
1951	80,675,000	74,496,000	6,179,000
1950	68,119,000	62,209,000	5,910,000
1949	66,939,000	60,709,000	6,230,000
1948	71,478,000	67,677,000	3,801,000
1947	47,731,481	42,796,049	4,935,432
1946	29,197,577	27,810,881	1,386,696
1945	17,170,119	16,097,799	1,072,320

Planting, Seeding, and Fertilizing Machinery

1952	$105,254,000	$100,856,000	$4,398,000
1951	108,890,000	103,508,000	5,382,000
1950	91,429,000	87,013,000	4,416,000
1949	89,166,000	85,371,000	3,795,000
1948	87,505,000	83,844,000	3,661,000
1947	57,678,819	54,743,355	2,935,464
1946	41,683,390	40,395,600	1,287,790
1945	32,055,195	30,869,192	1,186,003

Cultivators and Weeders

1952	$53,617,000	$50,731,000	$2,886,000
1951	63,077,000	59,298,000	3,779,000
1950	43,251,000	40,066,000	3,185,000
1949	52,518,000	48,820,000	3,698,000
1948	57,361,000	53,710,000	3,651,000
1947	36,101,723	33,906,154	2,195,569
1946	23,291,144	22,117,244	1,173,900
1945	23,486,010	22,002,201	1,483,809

Sprayers and Dusters

1952	$30,045,000	$26,596,000	$3,449,000
1951	35,892,000	31,907,000	3,985,000
1950	31,244,000	27,086,000	4,158,000
1949	27,574,000	24,357,000	3,217,000
1948	39,158,000	34,406,000	4,752,000
1947	34,793,025	30,921,780	3,871,245
1946	23,352,657	21,382,580	1,970,077
1945	12,226,475	11,436,951	789,524

Harvesting Machinery

	Total	Domestic	Export
1952	$254,731,000	$223,925,000	$30,806,000
1951	284,867,000	259,024,000	25,843,000
1950	241,629,000	221,530,000	20,099,000
1949	232,933,000	213,603,000	19,330,000
1948	189,937,000	172,691,000	17,246,000
1947	140,946,122	127,681,459	13,264,663
1946	75,969,443	70,426,481	5,542,962
1945	65,631,426	60,827,560	4,803,866

Haying Machinery

1952	$164,935,000	$155,394,000	$9,541,000
1951	175,556,000	165,036,000	10,520,000
1950	132,355,000	125,303,000	7,052,000
1949	127,847,000	118,064,000	9,783,000
1948	127,529,000	118,132,000	9,397,000
1947	72,506,586	67,446,450	5,060,136
1946	44,535,342	42,012,807	2,522,535
1945	33,662,612	31,786,341	1,876,271

Machines for Preparing Crops for Market or for Use

1952	$22,324,000	$19,076,000	$3,248,000
1951	24,041,000	20,397,000	3,644,000
1950	22,007,000	18,782,000	3,225,000
1949	24,724,000	21,291,000	3,433,000
1948	30,801,000	26,874,000	3,927,000
1947	32,615,682	29,738,585	2,877,097
1946	27,939,738	26,170,212	1,769,526
1945	18,105,070	17,231,361	873,709

Farm Poultry Equipment

1952	$22,890,000	$22,054,000	$836,000
1951	31,654,000	30,655,000	999,000
1950	26,858,000	26,206,000	652,000
1949	23,020,000	22,240,000	780,000
1948	18,738,000	17,919,000	819,000
1947	19,156,835	18,283,341	873,494
1946	22,284,761	21,559,062	725,699
1945	22,600,662	22,362,480	238,182

Farm Dairy Machines and Equipment

1952	$13,356,000	$12,332,000	$1,024,000
1951	13,063,000	12,121,000	942,000
1950	14,624,000	13,462,000	1,162,000
1949	13,621,000	11,896,000	1,725,000
1948	17,246,000	15,102,000	2,144,000
1947	24,654,642	22,143,586	2,511,056
1946	32,199,747	30,136,990	2,062,757
1945	34,056,429	32,804,454	1,251,975

Barn Equipment

	Total	Domestic	Export
1952	$13,073,000	$13,012,000	$61,000
1951	11,832,000	11,815,000	17,000
1950	9,582,000	9,567,000	15,000
1949	8,154,000	8,134,000	20,000
1948	12,195,000	12,174,000	21,000
1947	10,901,480	10,893,727	7,753
1946	8,640,207	8,633,523	6,684
1945	6,005,136	6,002,788	2,348

Barnyard Equipment

1952	$14,257,000	$14,198,000	$59,000
1951	20,964,000	20,898,000	66,000
1950	17,123,000	17,088,000	35,000
1949	13,102,000	13,059,000	43,000
1948	10,721,000	10,691,000	30,000
1947	8,621,632	8,599,384	22,248
1946	8,648,055	8,536,254	111,801
1945	7,861,272	7,855,047	6,225

Farm Elevators and Blowers

1952	$33,736,000	$32,500,000	$1,236,000
1951	34,521,000	33,701,000	820,000
1950	30,594,000	29,744,000	850,000
1949	29,122,000	28,669,000	453,000
1948	22,313,000	22,200,000	113,000
1947	14,298,722	14,169,363	129,359
1946	8,535,790	8,483,852	51,938
1945	5,463,754	5,442,827	20,927

Farm Wagons, Trucks, and Other Farm Transportation Equipment

1952	$23,039,000	$21,786,000	$1,253,000
1951	26,809,000	25,524,000	1,285,000
1950	20,939,000	19,425,000	1,514,000
1949	20,140,000	18,870,000	1,270,000
1948	34,306,000	32,562,000	1,744,000
1947	31,173,525	28,973,090	2,200,435
1946	23,970,305	23,423,231	547,074
1945	12,485,216	12,142,120	343,096

Tractors for Farm Use

1952	$636,959,000	$524,196,000	$112,763,000
1951	771,596,000	629,250,000	142,346,000
1950	620,583,000	503,913,000	116,670,000
1949	628,514,000	491,325,000	137,189,000
1948	547,704,000	436,992,000	110,712,000
1947	392,211,528	316,302,342	75,909,186
1946	221,839,744	179,510,599	42,329,145
1945	177,578,200	130,765,034	46,813,166

TRACTORS

Manufacturers' Shipments

U. S. Bureau of the Census

WHEEL TYPE—Farm Use

Year	Number	Value
1952	402,781	$532,715,000
1951	545,663	680,423,000
1950	490,539	535,374,000
1949	534,946	543,005,000
1948	510,847	468,083,292
1947	413,783	331,652,526
1946	243,271	180,362,770
1945	224,985	153,170,002

WHEEL TYPE—Non-Farm Use

Year	Number	Value
1952	14,396	$82,961,000
1951	14,310	77,578,000
1950	9,378	38,921,000
1949	10,422	29,425,000
1948	18,845	29,215,151
1947	14,882	17,681,997
1946	12,067	11,909,354
1945	18,707	15,725,730

Attachments and Parts—Totals

	Total	Domestic	Export
1952.....	$413,570,000	$347,774,000	$65,796,000
1951.....	445,835,000	376,559,000	69,276,000
1950.....	354,603,000	303,834,000	50,769,000
1949.....	388,940,000	331,714,000	57,226,000
1948.....	399,401,000	351,307,000	48,094,000
1947.....	318,697,725	280,647,520	38,050,205
1946.....	227,804,033	205,662,331	22,141,702
1945.....	209,672,797	186,042,806	23,629,991

Farm Machinery and Equipment

	Total	Domestic	Export
1952.....	$1,933,335,000	$1,681,181,000	$252,154,000
1951.....	2,204,491,000	1,917,415,000	287,076,000
1950.....	1,792,427,000	1,562,175,000	230,252,000
1949.....	1,813,008,000	1,550,934,000	262,074,000
1948.....	1,733,746,000	1,513,613,000	220,133,000
1947.....	1,294,685,851	1,132,685,460	162,000,391
1946.....	850,477,603	763,230,488	87,247,115
1945.....	700,177,355	612,595,399	87,581,956

ATTACHMENTS AND PARTS—BY PRODUCT GROUPS

Plows and Listers

	Total	Domestic	Export
1952....	$31,832,000	$28,925,000	$2,907,000
1951....	36,293,000	32,787,000	3,506,000
1950....	32,839,000	29,532,000	3,307,000
1949....	33,280,000	29,575,000	3,705,000
1948....	33,252,000	30,238,000	3,014,000
1947....	30,932,933	28,106,130	2,826,803
1946....	20,107,832	18,846,348	1,261,484
1945....	18,045,596	16,446,673	1,598,923

Harrows, Rollers, Pulverizers, Stalk Cutters

1952....	$12,720,000	$11,608,000	$1,112,000
1951....	13,513,000	12,426,000	1,087,000
1950....	9,597,000	8,557,000	1,040,000
1949....	9,921,000	9,089,000	832,000
1948....	9,476,000	9,071,000	405,000
1947....	9,691,421	9,154,751	536,670
1946....	7,436,387	7,153,826	282,561
1945....	5,428,470	5,278,585	149,885

Planting, Seeding, and Fertilizing Machinery

1952....	$23,290,000	$21,902,000	$1,388,000
1951....	25,172,000	23,684,000	1,488,000
1950....	21,624,000	20,455,000	1,169,000
1949....	25,709,000	24,000,000	1,709,000
1948....	22,000,000	21,079,000	921,000
1947....	16,298,538	15,202,033	1,096,505
1946....	12,154,142	11,693,405	460,737
1945....	11,230,810	10,785,620	445,190

Cultivators and Weeders

1952....	$17,754,000	$16,760,000	$994,000
1951....	17,906,000	16,689,000	1,217,000
1950....	14,002,000	12,971,000	1,031,000
1949....	17,651,000	16,401,000	1,250,000
1948....	22,708,000	21,512,000	1,196,000
1947....	14,261,456	13,522,678	738,778
1946....	10,650,655	10,307,610	343,045
1945....	10,080,756	9,708,607	372,149

Sprayers and Dusters

1952....	$6,384,000	$5,692,000	$692,000
1951....	6,638,000	5,811,000	827,000
1950....	5,535,000	4,793,000	742,000
1949....	4,585,000	3,967,000	618,000
1948....	5,300,000	4,698,000	602,000
1947....	4,762,488	4,401,061	361,425
1946....	2,927,284	2,600,123	327,161
1945....	2,488,806	2,259,214	229,592

Harvesting Machinery

	Total	Domestic	Export
1952....	$55,248,000	$48,994,000	$6,254,000
1951....	60,217,000	54,053,000	6,164,000
1950....	46,524,000	41,887,000	4,637,000
1949....	57,622,000	52,371,000	5,251,000
1948....	57,883,000	53,755,000	4,128,000
1947....	50,624,285	47,000,990	3,623,295
1946....	37,755,724	35,515,105	2,240,619
1945....	33,729,501	31,442,483	2,287,018

Haying Machinery

1952....	$34,233,000	$32,079,000	$2,154,000
1951....	33,990,000	31,579,000	2,411,000
1950....	22,624,000	21,257,000	1,367,000
1949....	23,944,000	22,382,000	1,562,000
1948....	25,866,000	24,103,000	1,763,000
1947....	22,358,038	20,471,525	1,886,513
1946....	15,319,554	14,338,547	981,007
1945....	15,793,396	14,672,695	1,120,701

Machines for Preparing Crops for Market or for Use

1952....	$9,025,000	$7,690,000	$1,335,000
1951....	12,365,000	10,781,000	1,584,000
1950....	8,545,000	7,473,000	1,072,000
1949....	10,659,000	9,460,000	1,199,000
1948....	11,415,000	10,178,000	1,237,000
1947....	9,396,860	8,397,290	999,570
1946....	8,106,300	7,372,080	734,220
1945....	7,124,969	6,499,718	625,251

Farm Poultry Equipment

1952....	$2,408,000	$2,358,000	$50,000
1951....	2,957,000	2,885,000	72,000
1950....	3,269,000	3,221,000	48,000
1949....	2,325,000	2,266,000	59,000
1948....	1,641,000	1,604,000	37,000
1947....	1,444,721	1,402,588	42,133
1946....	1,640,531	1,612,933	27,598
1945....	2,267,163	2,248,993	18,170

Farm Dairy Machines and Equipment

1952....	$8,115,000	$7,446,000	$669,000
1951....	9,247,000	8,547,000	700,000
1950....	8,345,000	7,443,000	902,000
1949....	6,436,000	5,639,000	797,000
1948....	6,197,000	5,501,000	696,000
1947....	6,760,753	6,054,092	706,661
1946....	9,352,856	8,350,156	1,002,700
1945....	12,695,795	12,023,449	672,346

Barn Equipment

	Total	Domestic	Export
1952....	$2,453,000	$2,442,000	$11,000
1951....	1,887,000	1,887,000	.....
1950....	1,718,000	1,714,000	4,000
1949....	1,896,000	1,893,000	3,000
1948....	1,012,000	1,012,000	.....
1947....	901,075	900,551	524
1946....	913,416	913,192	224
1945....	1,081,712	1,081,649	63

Barnyard Equipment

1952....	$807,000	$807,000	$.....
1951....	677,000	676,000	1,000
1950....	654,000	651,000	3,000
1949....	396,000	396,000	.....
1948....	194,000	194,000	.....
1947....	185,881	185,770	111
1946....	196,352	195,725	627
1945....	225,766	225,441	325

Farm Elevators and Blowers

1952....	$5,149,000	$4,965,000	$184,000
1951....	4,857,000	4,719,000	138,000
1950....	4,077,000	4,011,000	66,000
1949....	3,613,000	3,572,000	41,000
1948....	2,998,000	2,973,000	25,000
1947....	2,090,072	2,074,385	15,687
1946....	2,059,535	2,057,593	1,942
1945....	680,838	677,533	3,305

Farm Wagons, Trucks, and Other Farm Transportation Equipment

1952....	$6,169,000	$5,963,000	$206,000
1951....	6,187,000	5,788,000	399,000
1950....	5,164,000	4,823,000	341,000
1949....	4,199,000	3,936,000	263,000
1948....	4,612,000	4,337,000	275,000
1947....	4,840,844	4,572,705	268,139
1946....	4,500,040	4,284,631	215,409
1945....	3,378,514	3,290,915	87,599

Tractors for Farm Use

1952....	$197,983,000	$150,143,000	$47,840,000
1951....	213,929,000	164,247,000	49,682,000
1950....	170,086,000	135,046,000	35,040,000
1949....	186,704,000	146,767,000	39,937,000
1948....	194,847,000	161,052,000	33,795,000
1947....	144,148,362	119,200,971	24,947,391
1946....	94,683,425	80,421,057	14,262,368
1945....	85,420,705	69,401,231	16,019,474

TRACKLAYING TYPE—Farm Use

Year	Number	Value
1952.....	20,302	$76,146,000
1951.....	20,153	66,415,000
1950.....	18,978	62,960,000
1949.....	20,043	64,481,000
1948.....	17,365	49,569,000
1947.....	11,630	28,332,401
1946.....	8,898	18,117,637
1945.....	11,149	20,973,907

TRACKLAYING TYPE—Non-Farm Use

Year	Number	Value
1952.....	27,853	$204,695,000
1951.....	28,989	193,545,000
1950.....	25,622	160,527,000
1949.....	23,806	134,942,000
1948.....	22,208	112,438,000
1947.....	25,904	105,997,470
1946.....	17,367	64,816,042
1945.....	32,849	191,033,573

GARDEN TYPE—Farm and Non-Farm

Year	Number	Value
1952.....	202,492	$28,098,000
1951.....	168,352	24,758,000
1950.....	153,827	22,249,000
1949.....	131,427	21,028,000
1948.....	169,421	30,052,000
1947.....	172,252	33,151,065
1946.....	115,241	23,925,724
1945.....	27,962	3,592,296

Farm Equipment

METALWORKING FACTS AND FIGURES

DOMESTIC WATER SYSTEMS

Factory Shipments

Jet Pump Systems

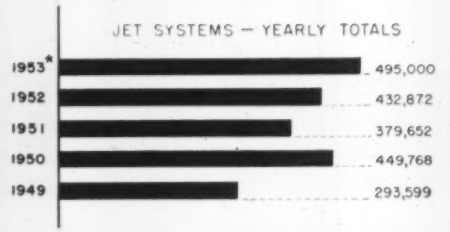
	Units	Value
1953*	495,000	
Jan.	30,687	$2,873,000
Feb.	31,481	2,943,000
Mar.	38,232	3,559,000
Apr.	41,913	3,874,000
May	41,403	3,832,000
June	45,755	4,280,000
July	45,888	4,363,000
Aug.	48,189	4,384,000
Sept.	45,457	4,336,000
Oct.		
Nov.		
1952	432,872	$41,769,000
Jan.	28,400	2,833,000
Feb.	30,540	2,950,000
Mar.	28,835	2,699,000
Apr.	33,092	3,160,000
May	35,253	3,449,000
June	38,834	3,719,000
July	41,665	4,051,000
Aug.	45,202	4,465,000
Sept.	43,991	4,186,000
Oct.	45,095	4,265,000
Nov.	33,551	3,243,000
Dec.	28,614	2,749,000
1951	379,652	$37,656,000
1950	449,768	38,935,000
1949	293,599	24,313,000
1948	329,022	27,519,000
1947	361,140	29,694,000

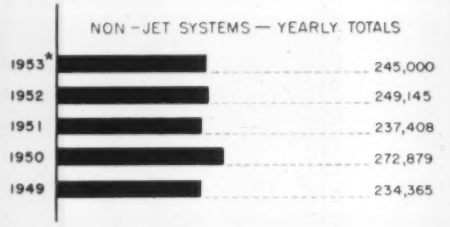
U. S. Bureau of the Census

Non-Jet Pump Systems

	Units	Value
1953*	245,000	
Jan.	16,526	$1,562,000
Feb.	16,662	1,543,000
Mar.	19,795	1,874,000
Apr.	19,344	1,532,000
May	15,568	1,175,000
June	17,760	1,424,000
July	16,353	1,375,000
Aug.	18,552	1,478,000
Sept.	18,340	1,447,000
Oct.		
Nov.		
1952	249,145	$25,972,000
Jan.	18,308	1,860,000
Feb.	20,626	2,112,000
Mar.	19,937	2,114,000
Apr.	21,500	2,365,000
May	20,246	2,084,000
June	21,083	2,267,000
July	21,958	2,198,000
Aug.	23,266	2,249,000
Sept.	23,750	2,407,000
Oct.	24,785	2,477,000
Nov.	18,909	2,043,000
Dec.	14,777	1,796,000
1951	237,408	$22,203,000
1950	272,879	21,269,000
1949	234,365	17,563,000
1948	329,825	23,653,000
1947	401,715	26,123,000

* Estimated





Domestic Hand and Windmill Pumps

Factory Shipments

1953	Units	Value
Jan.	19,356	$148,000
Feb.	20,677	152,000
Mar.	15,894	123,000
Apr.	17,490	111,000
May	15,005	107,000
June	19,463	133,000
July	22,649	174,000
Aug.	20,614	159,000
Sept.	23,649	169,000
Oct.		
1952	242,636	$1,809,000
Jan.	22,038	147,000
Feb.	24,835	166,000
Mar.	16,345	143,000
Apr.	18,413	151,000
May	17,050	142,000
June	18,034	139,000
July	18,619	141,000
Aug.	21,312	145,000
Sept.	25,921	202,000
Oct.	24,861	170,000
Nov.	18,943	150,000
Dec.	16,265	113,000

YEARLY TOTALS

1952	242,636	$1,809,000
1951	245,791	1,725,000
1950	334,357	1,941,000
1949	327,415	2,186,000
1948	456,650	2,892,000
1947	368,532	2,322,000
1946	313,023	1,623,000
1945	314,638	1,689,000
1944	380,240	1,955,000
1943	368,249	1,730,000
1942	377,331	1,631,000
1941	490,586	1,896,000
1940	420,941	1,553,000
1939	515,083	1,579,000
1938	383,131	1,337,000
1937	497,498	1,678,000
1936	531,376	1,742,000
1935	367,008	1,152,000
1934	388,840	1,200,000
1933	331,004	869,000
1932	225,736	766,000
1931	325,611	1,337,000
1930	395,166	2,079,000
1929	450,287	2,344,000

U. S. Bureau of the Census

Pump Jacks

Factory Shipments

1953	Units	Value
Jan.	3,594	$165,000
Feb.	2,700	72,000
Mar.	3,622	85,000
Apr.	2,578	81,000
May	1,822	56,000
June	1,886	62,000
July	2,218	68,000
Aug.	2,541	83,000
Sept.	2,657	81,000
Oct.		
1952	31,691	$975,000
Jan.	3,559	105,000
Feb.	2,974	87,000
Mar.	2,036	65,000
Apr.	1,931	67,000
May	1,648	52,000
June	1,699	51,000
July	2,564	79,000
Aug.	2,814	88,000
Sept.	2,548	84,000
Oct.	3,421	105,000
Nov.	3,518	103,000
Dec.	3,249	89,000

YEARLY TOTALS

1952	31,691	$975,000
1951	37,461	1,150,000
1950	43,237	1,187,000
1949	36,854	1,034,000
1948	41,952	1,083,000
1947	54,187	1,450,000
1946	89,460	2,257,000
1945	62,451	1,418,000
1944	56,550	1,230,000
1943	31,065	640,000
1942	55,665	906,000
1941	59,058	856,000
1940	47,842	630,000
1939	37,133	464,000
1938	30,198	362,000
1937	37,029	425,000
1936	35,163	300,000
1935	20,800	161,000
1934	n.a.	n.a.
1933	n.a.	n.a.
1932	n.a.	n.a.
1931	24,803	215,000
1930	40,269	320,000
1929	42,850	361,000
1928	42,518	364,000
1927	39,665	367,000

n.a.—Not available
U. S. Bureau of the Census

Windmill Towers

Factory Shipments

1953	Units	Value
Jan.	1,109†	$102,000
Feb.	1,144†	115,000
Mar.	488	40,000
Apr.	1,622†	144,000
May	566	59,000
June	609	55,000
July	425	42,000
Aug.	384	36,000
Sept.	365	35,000
Oct.		
1952	6,795	$625,000
Jan.	741	65,000
Feb.	612	54,000
Mar.	644	57,000
Apr.	825	74,000
May	597	55,000
June	531	55,000
July	638	55,000
Aug.	642	56,000
Sept.	540	61,000
Oct.	514	48,000
Nov.	338	29,000
Dec.	173	16,000

YEARLY TOTALS

1952	6,795	$625,000
1951	9,416	834,000
1950	9,092	788,000
1949	9,843	901,000
1948	19,115	1,430,000
1947	22,269	1,351,000
1946	22,416	1,043,000
1945	20,603	863,000
1944	18,236	727,000
1943	11,632	480,000
1942	11,373	468,000
1941	14,950	670,000
1940	14,647	641,000
1939	17,418	808,000
1938	16,898	662,000
1937	20,992	895,000
1936	22,366	815,000
1935	17,015	627,000
1934	n.a.	n.a.
1933	n.a.	n.a.
1932	n.a.	n.a.
1931	11,357	445,000
1930	26,038	1,009,000
1929	35,894	1,355,000
1928	50,215	1,433,000
1927	44,334	1,330,000

† Towers and heads combined
n.a.—Not available
U. S. Bureau of the Census

Windmill Heads

Factory Shipments

1953	Units	Value
Jan.	1,109†	$102,000
Feb.	1,144†	115,000
Mar.	938	93,000
Apr.	1,622†	144,000
May	1,166	107,000
June	1,458	124,000
July	1,165	102,000
Aug.	713	59,000
Sept.	779	73,000
Oct.		
1952	13,918	$1,245,000
Jan.	1,149	112,000
Feb.	1,232	110,000
Mar.	1,068	118,000
Apr.	1,635	153,000
May	1,377	123,000
June	1,363	111,000
July	1,372	113,000
Aug.	1,268	99,000
Sept.	1,070	93,000
Oct.	1,098	95,000
Nov.	736	74,000
Dec.	530	44,000

YEARLY TOTALS

1952	13,918	$1,245,000
1951	16,700	1,497,000
1950	20,736	1,674,000
1949	19,188	1,675,000
1948	31,835	2,183,000
1947	39,076	2,424,000
1946	46,004	2,113,000
1945	41,761	1,786,000
1944	40,540	1,699,000
1943	34,523	1,537,000
1942	37,642	1,624,000
1941	43,159	1,757,000
1940	45,787	1,755,000
1939	52,706	2,100,000
1938	46,455	1,923,000
1937	63,753	2,529,000
1936	70,125	2,508,000
1935	51,513	1,884,000
1934	57,836	1,981,000
1933	n.a.	n.a.
1932	n.a.	n.a.
1931	37,523	1,295,000
1930	69,793	2,554,000
1929	94,030	3,949,000
1928	99,050	3,944,000
1927	83,866	3,503,000

† Towers and heads combined
n.a.—Not available
U. S. Bureau of the Census

INDEXES OF INDUSTRIAL PRODUCTION

FEDERAL RESERVE BOARD—1935-1939 = 100

Total Industrial Production

Adjusted for Seasonal Variation

	1953	1952	1951	1950	1949
Jan.	236	221	221	183	191
Feb.	240	222	221	180	189
Mar.	243	221	222	187	184
Apr.	241	216	223	190	179
May	240	211	222	195	174
June	240	204	221	199	169
July	232	193	212	196	161
Aug.	236	215	217	209	170
Sept.	232	228	218	211	174
Oct.	231	230	218	216	166
Nov.	228	234	219	215	173
Dec.	...	235	218	218	179

YEARLY INDEXES—UNADJUSTED

1953*	236	1948	192	1943	239
1952	219	1947	187	1942	199
1951	226	1946	170	1941	162
1950	200	1945	203	1940	125
1949	176	1944	235	1939	109

Iron and Steel

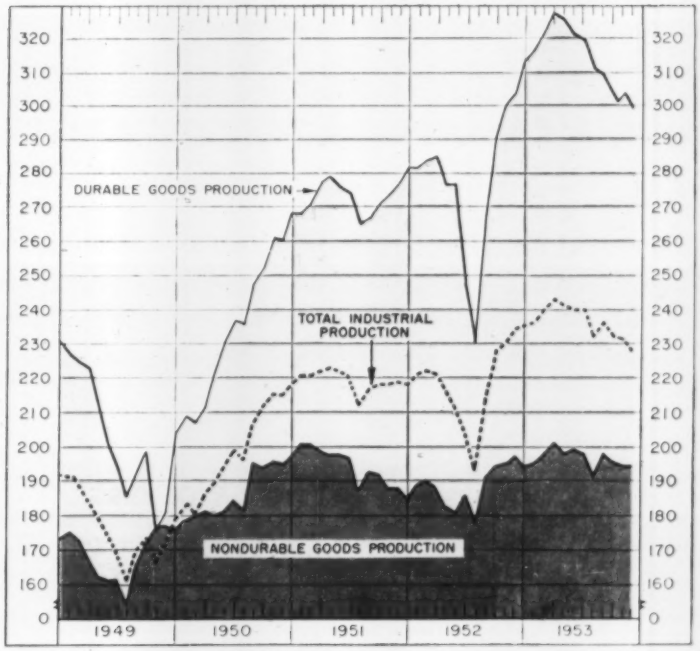
Adjusted for Seasonal Variation

	1953	1952	1951	1950	1949
Jan.	287	261	255	203	228
Feb.	290	261	252	201	232
Mar.	297	263	263	205	233
Apr.	292	245	264	222	219
May	291	246	263	226	204
June	288	140	261	231	177
July	276	139	253	228	156
Aug.	277	244	254	236	178
Sept.	261	270	258	245	179
Oct.	264	281	261	253	102
Nov.	...	283	261	246	145
Dec.	...	286	263	253	201

Nonferrous Metals and Products Output

Adjusted for Seasonal Variation

	1953	1952	1951	1950	1949
Jan.	250	216	224	180	183
Feb.	259	217	217	190	185
Mar.	259	218	209	201	183
Apr.	263	218	211	198	167
May	262	216	206	197	145
June	259	210	205	206	133
July	249	201	199	202	127
Aug.	243	213	197	212	141
Sept.	231	225	196	216	157
Oct.	232	237	201	223	164
Nov.	...	240	209	226	163
Dec.	...	246	207	227	167



Durable Goods

Adjusted for Seasonal Variation

	1953	1952	1951	1950	1949
Jan.	316	282	268	209	227
Feb.	322	284	271	207	225
Mar.	328	285	277	211	223
Apr.	326	277	279	222	212
May	321	277	276	231	201
June	319	247	274	237	194
July	311	230	265	235	185
Aug.	311	267	267	247	193
Sept.	301	290	271	251	199
Oct.	304	300	274	261	175
Nov.	299	304	277	260	181
Dec.	...	313	282	268	203

Nondurable Goods

Adjusted for Seasonal Variation

	1953	1952	1951	1950	1949
Jan.	195	189	201	179	175
Feb.	198	190	201	180	173
Mar.	201	188	199	181	168
Apr.	198	183	198	180	162
May	199	181	198	184	161
June	198	186	197	184	161
July	191	179	187	181	154
Aug.	197	191	193	195	165
Sept.	196	194	192	194	172
Oct.	194	195	188	196	177
Nov.	194	197	188	195	177
Dec.	...	194	185	197	176

Consumers' Price Index

Cost of Living. 1947-1949=100

	1953	1952	1951	1950
January	113.9	113.1	108.6	100.6
February	113.4	112.4	109.9	100.4
March	113.6	112.4	110.3	100.7
April	113.7	112.9	110.4	100.8
May	114.0	113.0	110.9	101.3
June	114.5	113.4	110.8	101.8
July	114.7	114.1	110.9	102.9
August	115.0	114.3	110.9	103.7
September	115.2	114.1	111.6	104.4
October	115.4	114.2	112.1	105.0
November	....	114.3	112.8	105.5
December	....	114.1	113.1	106.9

MONTHLY AVERAGES

1953*	114.5	1951	111.0
1952	113.5	1950	102.8

U. S. Bureau of Labor Statistics

Wholesale Price Indexes

1947-1949=100

ALL COMMODITIES

	1953	1952
January	109.9	113.0
February	109.6	112.5
March	110.0	112.3
April	109.4	111.8
May	109.8	111.6
June	109.5	111.2
July	110.9	111.8
August	110.6	112.2
September	111.0	111.8
October	110.2	111.1
November	....	110.7
December	....	109.6

ALL COMMODITIES OTHER THAN FARM PRODUCTS AND FOOD

	1953	1952
January	113.1	114.3
February	113.1	114.2
March	113.4	113.8
April	113.2	113.3
May	113.6	113.0
June	113.9	112.6
July	114.8	112.5
August	114.9	113.0
September	114.7	113.2
October	114.5	113.0
November	....	112.8
December	....	112.9

U. S. Bureau of Labor Statistics

* Estimated

Labor

METALWORKING FACTS AND FIGURES

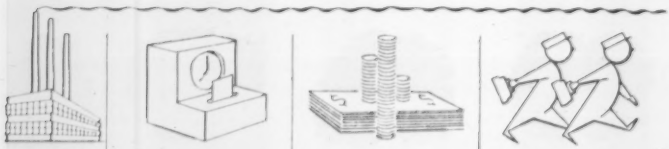
METALWORKING WAGES & HOURS (Production Workers)

(Average Hourly Wages and Average Weekly Hours)

	PRIMARY METALS		FABRICATED METAL PRODUCTS		MACHINERY Except Electrical		ELECTRICAL MACHINERY		TRANSPORTATION EQUIPMENT		INSTRUMENTS Related Products	
	Wages	Hours	Wages	Hours	Wages	Hours	Wages	Hours	Wages	Hours	Wages	Hours
1953												
Jan.	$2.03	41.7	$1.81	42.4	$1.93	43.0	$1.72	41.7	$2.03	41.9	$1.76	41.8
Feb.	2.01	41.4	1.82	42.2	1.94	42.8	1.73	41.2	2.05	41.8	1.76	41.7
Mar.	2.02	41.7	1.83	42.4	1.95	43.1	1.74	41.5	2.05	41.7	1.76	41.9
Apr.	2.02	41.2	1.83	42.2	1.95	42.8	1.74	41.3	2.06	41.6	1.75	41.2
May	2.02	41.4	1.84	42.1	1.95	42.5	1.74	40.8	2.05	41.5	1.76	41.6
June	2.05	41.5	1.84	42.0	1.95	42.3	1.75	40.7	2.07	41.1	1.77	41.6
July	2.09	41.2	1.85	41.4	1.95	41.7	1.76	40.1	2.07	40.6	1.77	40.7
Aug.	2.08	41.2	1.85	41.4	1.96	41.8	1.77	40.9	2.06	40.5	1.79	41.1
Sept.	2.12	40.4	1.86	40.7	1.98	41.5	1.78	40.6	2.07	39.6	1.80	41.3
Oct.	2.10	40.3	1.88	41.5	2.00	42.1	1.80	41.0	2.07	40.2	1.82	41.3
1952 (Av.)	1.90	40.7	1.74	41.6	1.86	42.8	1.67	41.1	1.97	41.4	1.72	41.9
1951 (Av.)	1.81	41.5	1.65	41.7	1.76	43.4	1.57	41.3	1.85	40.9	1.62	42.1

U. S. Department of Labor

METALWORKING PRODUCTION WORKERS



	HOURS PER WEEK (average)	HOURLY EARNINGS (average)	ANNUAL EMPLOYMENT (average)
1953*	41.1 HOURS	$1.89	6,024,900
1952	41.6 HOURS	$1.81	5,507,300
1951	41.8 HOURS	$1.71	5,456,600

METALWORKING EMPLOYMENT

(All Wage and Salary Workers, in Thousands)

	TOTAL	Primary Metals	Fabricated Metal Products	Machinery Except Electrical	Electrical Machinery	Transportation Equip.	Instruments etc.
1953							
Jan.	7,567	1,336	1,135	1,702	1,174	1,892	328
Feb.	7,653	1,339	1,150	1,713	1,192	1,930	329
Mar.	7,735	1,344	1,160	1,728	1,204	1,966	333
Apr.	7,729	1,344	1,161	1,714	1,207	1,970	333
May	7,693	1,338	1,162	1,702	1,202	1,956	333
June	7,693	1,346	1,168	1,698	1,195	1,951	335
July	7,611	1,337	1,152	1,666	1,179	1,944	333
Aug.	7,595	1,333	1,163	1,636	1,196	1,935	332
Sept.	7,529	1,321	1,156	1,624	1,205	1,889	334
Oct.	7,462	1,305	1,146	1,609	1,191	1,877	334
Nov.	....	....	....	....	....	....	....
1952 (Av.)	6,968	1,227	1,046	1,642	1,068	1,675	310
1951 (Av.)	6,690	1,345	1,007	1,591	937	1,511	299

U. S. Department of Labor

* Estimated.

Steel Industry's Minimum Labor Rates

	Hourly wage (cents)	Per cent over 1915
1915	20.0	....
February 1, 1916	22.0	10.0
May 1, 1916	25.0	25.0
December 15, 1916	27.5	37.5
May 1, 1917	30.0	50.0
October 1, 1917	33.0	65.0
April 16, 1918	38.0	90.0
August 1, 1918	42.0	110.0
October 1, 1918	46.2	131.0
February 1, 1920	50.6	153.0
May 16, 1921	40.5	102.5
July 16, 1921	37.0	85.0
August 29, 1921	30.0	50.0
September 1, 1922	36.0	80.0
April 16, 1923	40.0	100.0
August, 1923	44.0	120.0
October 1, 1931	39.6	98.0
May 16, 1932	33.7	68.5
August 19, 1933 (NRA)	40.0	100.0
April 1, 1934	44.0	120.0
November, 1936	52.5	162.5
March, 1937	62.5	212.5
April, 1941	72.5	262.5
July, 1942	78.0	290.0
February, 1946	96.5	382.5
April, 1947	109.0	445.0
July 16, 1948	118.5	492.5
December 1, 1950	131.0	555.0
March 1, 1952	143.5	617.5
June 12, 1953	152.0	660.0

Compiled by STEEL

Work Stoppages

1953	Number of Stoppages in Effect	Workers Involved	Man-Days Lost
10 Mos.	6,400	3,070,000	21,400,000
Jan.	500	250,000	1,250,000
Feb.	550	200,000	1,000,000
Mar.	650	230,000	1,100,000
Apr.	700	350,000	2,500,000
May	750	370,000	3,000,000
June	725	400,000	3,750,000
July	700	410,000	3,000,000
Aug.	675	400,000	2,800,000
Sept.	600	210,000	1,550,000
Oct.	550	250,000	1,450,000
	Number of Stoppages Started	Workers Involved	Man-Days Lost
1952	7,345	6,733,000	59,024,000
1951	7,124	3,229,000	22,910,000

U. S. Department of Labor

Steel Employment, Wages, Hours and Payrolls

1953 By Months

	Number Employees (Wage and salaried workers)	Av. Hrly. Earnings (Hourly, piecework or tonnage wages)	Av. Hrs. per Week (Hourly, piecework or tonnage wages)	Total Payrolls (Wages and salaries)
Jan.	683,800	$2.216	40.7	$285,361,000
Feb.	684,900	2.208	40.7	261,272,000
Mar.	683,100	2.206	40.3	281,000,000
Apr.	685,000	2.203	41.0	278,324,000
May	685,300	2.222	39.9	280,953,000
June	690,200	2,263	39.9	282,127,000
July	696,000	2.310	38.1	288,052,000
Aug.	695,600	2.318	38.2	287,253,000
Sept.	687,000	2.328	39.2	283,773,000
Oct.	.....	....	...	.....
Nov.	.....	....	...	.....
Dec.	.....	....	...	.....

1952 By Months

Jan.	672,100	$1.958	41.4	$252,236,000
Feb.	674,000	1.942	40.9	234,864,000
Mar.	672,100	1.950	39.8	242,731,000
Apr.	669,600	1.938	37.7	225,568,000
May	662,600	1.971	36.1	223,148,000
June	a.	a.	a.	a.
July	a.	a.	a.	a.
Aug.	659,800	2.139	38:2	250,361,100
Sept.	673,600	2.206	40.3	269,391,100
Oct.	676,800	2.161	41.8	282,896,000
Nov.	680,300	2.218	39.6	269,709,000
Dec.	684,400	2.211	39.5	280,046,000
Year 1952†	672,530	$2.069	39.5	$2,530,950,000

a. = No reports issued because of steelworkers' strike.

1951 By Months

Jan.	657,200	$1.933	41.6	$245,294,000
Feb.	662,700	1.916	40.4	219,412,000
Mar.	663,100	1.920	40.4	238,318,000
Apr.	665,700	1.926	40.5	234,769,000
May	667,300	1.942	41.6	249,007,000
June	674,200	1.950	40.5	240,707,000
July	678,200	1.955	37.3	231,951,000
Aug.	679,100	1.931	40.4	246,670,000
Sept.	676,700	1.974	39.1	236,322,000
Oct.	674,600	1.931	41.4	249,856,000
Nov.	675,300	1.978	40.2	242,138,000
Dec.	675,100	1.987	39.0	246,726,000
Year 1951	670,717	$1.945	40.2	$2,881,170,000

1950 By Months

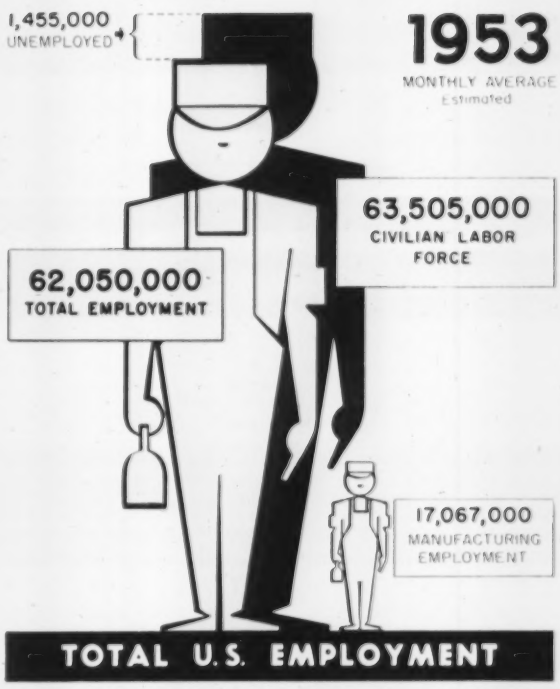
Jan.	609,400	$1.720	38.5	$189,346,000
Feb.	613,400	1.704	38.8	174,723,000
Mar.	615,600	1.697	38.8	189,964,000
Apr.	621,100	1.707	38.5	186,185,000
May	628,200	1.722	39.7	199,905,000
June	635,900	1.714	39.3	195,332,000
July	643,000	1.744	35.5	188,711,000
Aug.	648,900	1.717	39.7	206,623,000
Sept.	649,500	1.757	39.4	203,783,000
Oct.	650,400	1.726	40.7	212,187,000
Nov.	653,200	1.763	39.8	208,000,000
Dec.	657,000	1.960	38.9	235,000,000
Year 1950	635,500	$1.746	39.0	$2,389,759,000

MONTHLY AVERAGES, AND TOTAL PAYROLLS

1952†	672,530	$2.069	39.5	$2,530,950,000
1951	670,717	1.945	40.2	2,881,170,000
1950	635,500	1.746	39.0	2,389,759,000
1949	620,500	1.703	34.5	2,061,770,000
1948	635,600	1.630	39.1	2,234,461,000
1947	616,300	1.513	38.6	1,986,600,000
1946	575,300	1.347	35.1	1,544,142,000
1945	551,200	1.248	44.2	1,645,332,700
1944	571,200	1.219	46.7	1,745,019,700
1943	625,700	1.135	43.0	1,649,227,000
1942	647,200	1.056	38.9	1,467,058,700
1941	633,000	959	38.6	1,301,347,800
1940	546,800	850	36.2	960,779,300
1939	482,585	840	34.8	812,775,082
1938	442,739	830	27.6	613,198,987

† 10 Months

American Iron & Steel Institute



(In Thousands)

1953 By Months

	Civilian Labor Force	Total Employment	Unemployment	Mfg. Employment
Jan.	62,416	60,524	1,892	16,884
Feb.	62,712	60,924	1,788	17,013
Mar.	63,134	61,460	1,674	17,135
Apr.	62,810	61,228	1,582	17,077
May	62,964	61,658	1,306	17,040
June	64,734	63,172	1,562	17,145
July	64,668	63,120	1,548	17,037
Aug.	64,648	63,408	1,240	17,265
Sept.	63,552	62,306	1,246	17,215
Oct.	63,404	62,242	1,162	17,011
Nov.	.....	.....	....	.....
Dec.	.....	.....	....	.....

1952 By Months

Jan.	61,780	59,726	2,054	15,958
Feb.	61,838	59,752	2,086	16,045
Mar.	61,518	59,714	1,804	16,061
Apr.	61,744	60,132	1,612	15,994
May	62,778	61,176	1,602	15,855
June	64,390	62,572	1,818	15,624
July	64,176	62,234	1,942	15,402
Aug.	63,958	62,354	1,604	16,280
Sept.	63,698	62,260	1,438	16,680
Oct.	63,146	61,862	1,284	16,778
Nov.	63,646	62,228	1,418	16,874
Dec.	62,921	61,509	1,412	16,952
1952 Av.	62,966	61,293	1,673	16,209

1951 By Months

Jan.	61,514	59,010	2,503	15,784
Feb.	61,313	58,905	2,407	15,978
Mar.	62,325	60,179	2,147	16,022
Apr.	61,789	60,044	1,744	15,955
May	62,803	61,193	1,609	15,853
June	63,783	61,803	1,980	15,956
July	64,382	62,526	1,856	15,813
Aug.	64,208	62,630	1,578	16,008
Sept.	63,186	61,580	1,606	16,039
Oct.	63,452	61,836	1,616	15,965
Nov.	63,164	61,336	1,828	15,890
Dec.	62,688	61,014	1,674	15,913
1951 Av.	62,884	61,005	1,879	15,931

MONTHLY AVERAGES

1950	63,099	59,957	3,142	14,884
1949	62,105	58,710	3,395	14,146
1948	61,442	59,378	2,064	15,286
1947	60,168	58,027	2,142	15,247
1946	57,520	55,250	2,270	14,461
1945	53,860	52,820	1,040	15,302
1944	54,630	53,960	670	17,111
1943	55,540	54,470	1,070	17,381
1942	56,410	53,750	2,660	15,051
1941	55,910	50,350	5,560	12,974
1940	55,640	47,520	8,120	10,780
1939	55,230	45,750	9,480	10,078
1938	54,610	44,220	10,390	9,253

U. S. Department of Labor
U. S. Department of Commerce

Labor

Labor Union Membership

Thousands of Members

Year	American Federation of Labor	Congress of Industrial Organizations	Independent or Unaffiliated Unions	Total
1953†	10,000	5,000	2,000–2,500	17,000–17,500‡
1952	9,500	5,000	2,000–2,500	16,500–17,000‡
1951	9,500	5,000	2,000–2,500	16,500–17,000
1950	7,143	n.a.	2,400–2,800	14,000–16,000
1949	7,241	n.a.	2,000–2,300	14,000–16,000
1948	7,221	n.a.	2,200–2,500	14,000–16,000
1947	7,578	6,000	1,836	15,414
1946	7,152	6,000	1,822	14,974
1945	6,931	6,000	1,865	14,796
1944	6,807	5,935	1,879	14,621
1943	6,564	5,285	1,793	13,642
1942	5,483	4,195	1,084	10,762
1941	4,569	5,000	920	10,489
1940	4,247	3,625	1,072	8,944
1939	4,006	4,000	974	8,980
1938	3,623	4,038	604	8,265
1937	2,861	3,718	639	7,218
1936	3,422	....	742	4,164
1935	3,045	....	683	3,728
1934	2,608	....	641	3,249
1933	2,127	....	730	2,857
1932	2,532	....	694	3,226
1931	2,890	....	636	3,526
1930	2,961	....	671	3,632
1929	2,934	....	691	3,625
1928	2,896	....	671	3,567
1927	2,813	....	787	3,600
1926	2,804	....	788	3,592
1925	2,877	....	689	3,566
1924	2,866	....	683	3,549
1923	2,926	....	703	3,629
1922	3,196	....	754	3,950
1921	3,907	....	815	4,722
1920	4,079	....	955	5,034
1919	3,260	....	786	4,046
1918	2,726	....	642	3,368
1917	2,371	....	605	2,976
1916	2,073	....	649	2,722
1915	1,946	....	614	2,560
1914	2,021	....	626	2,647
1913	1,996	....	665	2,661
1912	1,770	....	635	2,405
1911	1,762	....	556	2,318
1910	1,562	....	554	2,116
1909	1,483	....	482	1,965
1908	1,587	....	505	2,092
1907	1,539	....	538	2,077
1906	1,454	....	438	1,892
1905	1,494	....	424	1,918
1904	1,676	....	391	2,067
1903	1,466	....	358	1,824
1902	1,024	....	311	1,335
1901	788	....	270	1,058
1900	548	....	243	791
1899	349	....	201	550
1898	278	....	189	467

U. S. Department of Labor

† Estimated by STEEL. n.a. = Not available

‡ Including 796,000 in Canada.

Labor Turn-Over

Rates Per 100 Employees in Manufacturing Industries

	SEPARATIONS									
	Quit		Discharge		Lay-Off		Miscellaneous		Total	
	1953	1952	1953	1952	1953	1952	1953	1952	1953	1952
Jan.	2.1	1.9	0.3	0.3	0.9	1.4	0.4	0.4	3.8	4.0
Feb.	2.2	1.9	0.4	0.3	0.8	1.3	0.4	0.4	3.6	3.9
Mar.	2.5	2.0	0.4	0.3	0.8	1.1	0.3	0.3	4.1	3.7
Apr.	2.7	2.2	0.4	0.3	0.9	1.3	0.3	0.3	4.3	4.1
May	2.7	2.2	0.4	0.3	1.0	1.1	0.3	0.3	4.4	3.9
June	2.6	2.2	0.4	0.3	0.9	1.1	0.3	0.3	4.2	3.9
July	2.6	2.2	0.4	0.3	1.2	2.2	0.3	0.3	4.4	5.0
Aug.	2.9	3.0	0.4	0.3	1.3	1.0	0.3	0.3	4.8	4.6
Sept.	3.1	3.5	0.4	0.4	1.5	0.7	0.3	0.3	5.2	4.9
Oct.	2.1	2.8	0.4	0.4	1.8	0.7	0.3	0.3	4.5	4.2
Nov.	..	2.1	..	0.4	..	0.7	..	0.3	..	3.5
Dec.	..	1.7	..	0.3	..	1.1	..	0.3	..	3.5

ACCESSIONS								
	1953	1952		1953	1952		1953	1952
Jan.	4.4	4.4	May	4.1	3.9	Sept.	4.0	5.6
Feb.	4.2	3.9	June	5.1	4.9	Oct.	3.4	4.0
Mar.	4.4	3.9	July	4.0	4.4	Nov.	..	4.0
Apr.	4.3	3.7	Aug.	4.3	5.9	Dec.	..	3.3

U. S. Department of Labor

Wages and Hours in Selected Industries

(Production Workers)

Stamped and Pressed Metal Products

	EARNINGS (Hourly Avg.)		HOURS (Weekly Avg.)	
	1953	1952	1953	1952
Jan.	$1.92	$1.80	43.5	42.0
Feb.	1.92	1.81	42.8	42.0
Mar.	1.93	1.83	42.7	41.7
Apr.	1.92	1.81	42.8	41.8
May	1.93	1.82	42.4	41.2
June	1.95	1.82	42.2	40.8
July	1.98	1.79	42.0	38.1
Aug.	....	1.82	....	40.4
Sept.	....	1.89	....	42.4
Oct.	....	1.91	....	43.4
Nov.	....	1.90	....	43.0
Dec.	....	1.93	....	44.4

Metalworking Machinery

(Except Machine Tools)

	1953	1952	1953	1952
Jan.	$2.01	$1.85	45.0	45.7
Feb.	2.01	1.87	45.0	45.9
Mar.	2.01	1.88	45.1	46.1
Apr.	2.03	1.87	45.2	44.7
May	2.03	1.87	44.5	45.2
June	2.02	1.87	44.6	45.3
July	2.02	1.87	44.9	43.3
Aug.	....	1.90	....	44.3
Sept.	....	1.93	....	44.8
Oct.	....	1.95	....	44.5
Nov.	....	2.00	....	44.8
Dec.	....	2.01	....	45.9

Machine Tools

	1953	1952	1953	1952
Jan.	$1.99	$1.86	47.7	48.6
Feb.	2.02	1.87	46.9	47.7
Mar.	2.03	1.89	47.3	47.6
Apr.	2.04	1.88	47.1	46.9
May	2.04	1.89	46.7	46.9
June	2.04	1.89	45.8	46.5
July	2.01	1.87	44.7	45.3
Aug.	....	1.91	....	46.5
Sept.	....	1.94	....	47.1
Oct.	....	1.95	....	47.0
Nov.	....	1.97	....	46.7
Dec.	....	1.98	....	47.9

Fabricated Structural Metal Products

	1953	1952	1953	1952
Jan.	$1.84	$1.72	42.6	42.7
Feb.	1.86	1.72	42.6	42.8
Mar.	1.86	1.73	42.9	42.8
Apr.	1.86	1.73	42.8	41.8
May	1.87	1.73	42.7	42.4
June	1.88	1.73	42.9	41.7
July	1.89	1.73	41.9	41.0
Aug.	....	1.79	....	41.6
Sept.	....	1.80	....	42.6
Oct.	....	1.82	....	42.9
Nov.	....	1.83	....	42.7
Dec.	....	1.85	....	43.2

Agricultural Machinery and Tractors

	EARNINGS (Hourly Avg.)		HOURS (Weekly Avg.)	
	1953	1952	1953	1952
Jan.	$1.94	$1.86	39.9	40.8
Feb.	1.95	1.89	40.3	40.2
Mar.	1.95	1.90	40.4	41.0
Apr.	1.96	1.92	40.4	40.8
May	1.94	1.92	39.9	40.7
June	1.94	1.90	39.8	40.0
July	1.94	1.87	39.5	37.4
Aug.	....	1.87	....	39.1
Sept.	....	1.83	....	39.1
Oct.	....	1.85	....	39.8
Nov.	....	1.88	....	38.8
Dec.	....	1.93	....	40.8

Automobiles

	1953	1952	1953	1952
Jan.	$2.10	$1.99	41.4	40.5
Feb.	2.11	1.98	41.7	40.4
Mar.	2.11	2.00	41.8	40.4
Apr.	2.12	2.00	41.9	39.9
May	2.10	2.00	41.5	40.1
June	2.15	2.01	41.2	39.4
July	2.15	1.99	40.4	35.9
Aug.	....	2.03	....	38.4
Sept.	....	2.11	....	41.8
Oct.	....	2.14	....	43.1
Nov.	....	2.13	....	41.9
Dec.	....	2.13	....	42.4

Aircraft and Parts

	1953	1952	1953	1952
Jan.	$1.98	$1.84	43.3	43.2
Feb.	1.98	1.85	43.0	43.2
Mar.	1.99	1.88	42.3	42.9
Apr.	1.98	1.86	42.0	42.0
May	1.98	1.88	41.7	42.8
June	1.98	1.89	41.2	42.7
July	1.98	1.89	41.5	42.7
Aug.	....	1.89	....	42.3
Sept.	....	1.93	....	43.6
Oct.	....	1.94	....	43.0
Nov.	....	1.96	....	43.1
Dec.	....	1.96	....	43.9

Gray Iron Foundries

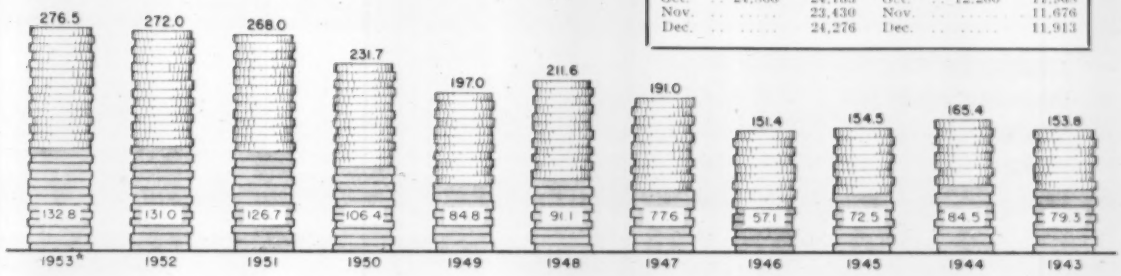
	1953	1952	1953	1952
Jan.	$1.79	$1.71	40.4	41.4
Feb.	1.81	1.71	40.6	40.3
Mar.	1.83	1.72	41.8	40.6
Apr.	1.84	1.72	41.9	40.0
May	1.84	1.72	41.2	40.0
June	1.85	1.72	41.6	39.9
July	1.86	1.67	41.0	38.6
Aug.	....	1.72	....	39.7
Sept.	....	1.76	....	41.3
Oct.	....	1.79	....	41.5
Nov.	....	1.78	....	40.4
Dec.	....	1.79	....	41.2

ANNUAL SALES TOTALS

(BILLIONS OF DOLLARS—NOT ADJUSTED FOR SEASONAL VARIATION)

Entire Bar=All Manufacturing Industries
Shaded Area=Durable Goods Industries

U. S. Office of Business Economics



1953-1952 By Months

(Millions of Dollars, Seasonally Adjusted)

	All Manufacturing Industries			Durable Goods Industries	
	1953	1952		1953	1952
Jan.	24,292	22,634	Jan.	12,195	10,861
Feb.	25,170	23,506	Feb.	12,828	11,352
Mar.	25,469	22,085	Mar.	12,821	10,632
Apr.	26,850	23,538	Apr.	13,490	11,310
May	26,226	23,247	May	13,238	11,328
June	26,172	21,888	June	13,046	10,060
July	26,514	21,858	July	13,144	9,777
Aug.	25,398	21,898	Aug.	12,615	10,437
Sept.	24,876	23,663	Sept.	12,200	11,510
Oct.	24,800	24,753	Oct.	12,200	11,968
Nov.	.....	23,430	Nov.	.....	11,676
Dec.	.....	24,276	Dec.	.....	11,913

Inventories at End of Month

Millions of Dollars, Seasonally Adjusted

	All Manufacturing Industries		Durable Goods Industries	
	1953	1952	1953	1952
January	43,766	43,178	24,392	23,211
February	43,848	43,168	24,480	23,313
March	44,056	43,237	24,746	23,401
April	44,566	43,402	25,122	23,596
May	44,970	43,144	25,420	23,595
June	45,525	42,892	25,775	23,348
July	45,792	42,748	25,983	22,962
August	46,195	43,107	26,302	23,200
September	46,500	43,224	26,447	23,292
October	46,300	43,415	26,500	23,615
November	.....	43,596	.....	23,835
December	.....	43,824	.....	24,292

U. S. Office of Business Economics

Manufacturers' New Orders

Value—Millions of Dollars. Adjusted for Seasonal Variation

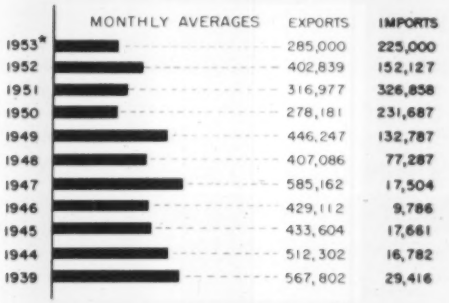
1953	Total Durables	Primary Metals	Fab. Metal Products	Electrical Mchy.	Mchy. Except Elec.	Transptn. Equip.	Other† Durables and Ordnance	—Total Durables— 1952	1951	1950
Jan.	12,080	2,027	1,408	1,579	1,784	2,946	2,335	11,142	15,269	7,321
Feb.	13,138	2,165	1,390	1,363	1,813	3,824	2,583	11,392	14,581	7,356
Mar.	12,023	2,080	1,322	1,096	1,894	2,792	2,838	11,841	14,526	7,717
Apr.	12,621	2,083	1,330	1,684	2,202	2,415	2,907	12,761	13,685	8,150
May	12,444	2,206	1,527	1,426	1,956	2,564	2,765	11,492	14,022	9,875
June	12,456	2,152	1,233	1,189	1,946	3,160	2,777	12,423	12,459	9,979
July	11,078	1,862	1,359	1,423	1,652	1,928	2,854	11,393	12,110	11,734
Aug.	9,541	1,591	1,309	1,116	1,595	1,695	2,234	12,328	10,681	13,683
Sept.	9,650	1,704	1,138	931	1,713	1,825	2,339	12,188	10,266	12,356
Oct.	.....	.....	.....	.....	.....	.....	.....	11,452	12,567	12,347
Nov.	.....	.....	.....	.....	.....	.....	.....	11,441	11,820	11,258
Dec.	.....	.....	.....	.....	.....	.....	.....	12,011	10,937	12,913

† Includes professional and scientific instruments, lumber, furniture, stone, clay and glass and miscellaneous industries.
U. S. Office of Business Economics

IRON & STEEL PRODUCTS

Exports and Imports

Excluding Advanced Manufactures—Net Tons



1953-1952 By Months

	Exports		Imports	
	1953	1952	1953	1952
January	328,091	402,302	149,371	235,432
February	283,903	407,617	136,349	182,090
March	313,602	502,780	181,185	148,562
April	293,087	483,092	266,254	119,661
May	306,774	529,414	261,581	99,260
June	285,251	340,490	269,806	92,539
July	251,365	223,832	312,969	89,559
August	233,702	302,079	272,106	111,957
September	.....	367,876	.....	142,336
October	.....	448,197	.....	221,304
November	.....	387,319	.....	177,224
December	.....	440,042	.....	205,599

U. S. Office of Business Economics

Foreign Trade

Value—Millions of Dollars

	Exports			Imports		
	1953	1952	1951	1953	1952	1951
Jan.	1,291	1,254	974	922	922	1,023
Feb.	1,197	1,344	1,076	856	893	910
Mar.	1,388	1,447	1,285	1,004	964	1,100
Apr.	1,395	1,352	1,370	1,012	932	1,033
May	1,446	1,473	1,354	902	834	1,018
June	1,376	1,167	1,294	934	861	930
July	1,348	1,027	1,190	908	839	894
Aug.	1,184	1,086	1,269	841	817	881
Sept.	1,244	1,225	1,232	923	877	721
Oct.	.....	1,213	1,152	.....	918	834
Nov.	.....	1,186	1,387	.....	804	819
Dec.	.....	1,390	1,438	.....	1,051	801

Monthly Averages

	Exports	Imports
1953*	1,289	917
1952	1,264	893
1951	1,252	914
1950	856	738
1949	1,003	552
1948	1,054	594
1947	1,278	480
1946	812	412
1945	817	347
1944	1,188	327
1943	1,080	282
1942	673	230
1939	265	193

U. S. Bureau of the Census

Iron and Steel Scrap

(Net Tons)

	Exports		Imports	
	1953	1952	1953	1952
Jan.	12,147	21,992	5,254	15,169
Feb.	24,012	16,247	10,846	9,285
Mar.	16,033	17,074	10,185	12,115
Apr.	17,417	21,200	11,255	13,441
May	17,699	29,928	3,138	7,635
June	19,416	42,058	15,032	2,829
July	15,988	54,735	22,083	4,805
Aug.	35,513	36,708	18,669	7,601
Sept.	.....	21,991	.....	8,024
Oct.	.....	39,176	.....	5,133
Nov.	.....	19,790	.....	11,767
Dec.	.....	19,692	.....	8,692

Monthly Averages

	Exports	Imports
1953*	21,520	13,874
1952	28,383	8,825
1951	19,407	29,925
1950	18,080	61,483
1949	24,883	91,994
1948	20,308	34,589
1947	16,185	3,016
1946	12,424	2,519
1945	7,978	3,856
1944	7,973	9,070
1943	4,575	11,955
1942	11,811	7,680
1939	334,548	2,753

* Estimated

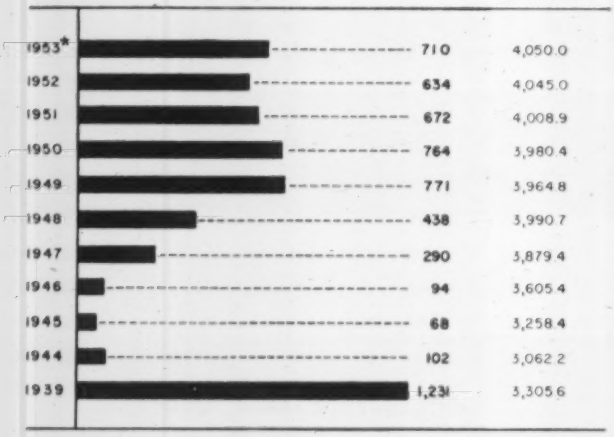
U. S. Office of Business Economics

Trade

METALWORKING FACTS AND FIGURES

BUSINESS FAILURES

Total Monthly Averages



	TOTAL BUSINESSES IN OPERATION (Thousands)
1953*	4,050.0
1952	4,045.0
1951	4,008.9
1950	3,980.4
1949	3,964.8
1948	3,990.7
1947	3,879.4
1946	3,605.4
1945	3,258.4
1944	3,062.2
1939	3,305.6

Failures—Liabilities

	FAILURES			LIABILITIES	
	Total	Construction	Mfg., Mining	Construction	Mfg., Mining
1953					
January	647	78	130	$2,735,000	$9,107,000
February	691	86	132	3,378,000	8,452,000
March	739	85	154	3,506,000	12,213,000
April	693	86	140	3,748,000	10,585,000
May	697	70	143	2,511,000	13,981,000
June	817	99	145	3,200,000	11,179,000
July	724	64	164	2,789,000	17,139,000
August	700	92	148	3,868,000	10,267,000
September	686	89	145	4,451,000	13,676,000
October	840	89	188	4,366,000	14,956,000
November	...	..	...	.....	.....
December	...	..	...	.....	.....
Monthly Averages					
1953*	723	..	...	.....	.....
1952	634	70	132	$3,012,083	$8,746,167
1951	672	80	128	3,123,000	7,581,000
1950	764	76	173	2,138,000	7,925,000
1949	771	70	194	2,270,000	11,939,000
1948	438	37	123	1,301,000	10,858,000
1947	290	20	106	601,000	11,894,000
1946	94	12	39	362,000	3,241,000
1945	68	8	23	297,000	1,437,000
1944	102	14	29	198,000	1,681,000
1939	1,231	54	243	919,000	5,929,000

Dun & Bradstreet Inc.

Businesses in Operation

(In Thousands at End of Quarter)

	Total	Contract Construction	Manufacturing	Service
1953				
First Qtr.	4,059.0	404.4	300.5	868.2
Second Qtr.	4,043.4	403.2	295.4	867.2
1952 (Avg.)	4,045.0	396.8	302.3	865.5
First Qtr.	4,035.9	390.6	305.1	863.2
Second Qtr.	4,050.0	399.4	303.1	865.8
Third Qtr.	4,059.0	404.4	300.5	868.2
Fourth Qtr.	4,056.4	405.3	297.2	869.7
Annual Averages				
1951	4,008.9	375.4	305.9	857.5
1950	3,980.4	358.0	303.0	854.5
1949	3,964.8	335.0	312.0	853.0
1948	3,990.7	321.0	329.6	857.4
1947	3,879.4	289.3	330.6	830.6
1946	3,605.4	242.6	301.9	772.8
1945	3,258.4	176.8	262.8	706.0
1944	3,062.2	153.4	245.2	657.1
1943	3,045.1	157.5	238.8	652.5
1942	3,302.2	177.2	237.9	699.2
1941	3,363.6	186.8	235.3	705.8

U. S. Office of Business Economics

New Business Incorporations

	1953	1952	1951	1950	1949
January	9,468	8,357	8,515	9,070	7,906
February	7,943	7,138	6,590	7,736	6,362
March	9,659	7,902	7,649	9,180	7,637
April	9,507	8,284	7,653	8,375	7,273
May	8,968	7,915	7,544	9,216	7,445
June	8,926	7,819	6,810	8,861	7,260
July	8,703	7,549	6,428	7,191	6,424
August	7,487	7,088	6,496	7,201	6,828
September	7,433	7,529	5,950	6,277	6,867
October	8,267	8,223	6,812	6,782	6,877
November	....	6,741	6,289	6,256	6,755
December	....	8,274	6,913	6,780	7,857
Total	....	92,819	83,649	92,925	85,491
Monthly Avg.	8,677	7,735	6,971	7,744	7,124

Dun & Bradstreet Inc.

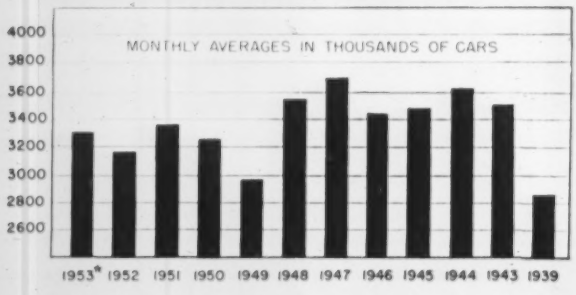
Discontinued Businesses

(Thousands)

	Total	Contract Construction	Manufacturing	Service
1953				
First Qtr.	81.3	11.2	11.2	12.9
Second Qtr.	96.0	13.6	13.3	15.7
1952 (Avg.)	90.4	12.5	11.9	14.9
First Qtr.	100.8	13.9	12.1	17.6
Second Qtr.	96.6	13.4	12.8	16.0
Third Qtr.	81.3	11.2	11.2	12.9
Fourth Qtr.	83.0	11.4	11.4	13.2
Annual Averages				
1951	94.4	13.4	11.0	16.7
1950	91.3	11.4	10.6	18.2
1949	96.6	11.7	13.3	18.8
1948	92.7	10.8	11.9	19.8
1947	72.9	9.1	10.3	15.2

U. S. Office of Business Economics

FREIGHT CARLOADINGS



1953—By Weeks

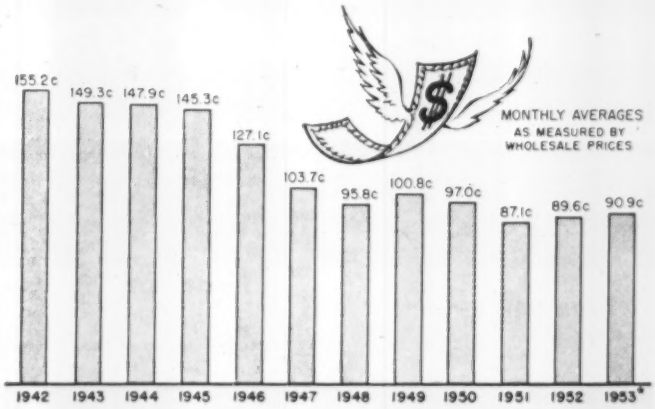
Jan. 3	563,085	May 2	781,499	Sept. 5	799,079
Jan. 10	688,232	May 9	765,411	Sept. 12	710,554
Jan. 17	705,479	May 16	779,805	Sept. 19	823,884
Jan. 24	697,641	May 23	769,618	Sept. 26	819,709
Jan. 31	697,616	May 30	786,755	Oct. 3	812,554
Feb. 7	690,744	June 6	775,489	Oct. 10	804,070
Feb. 14	681,750	June 13	797,425	Oct. 17	822,539
Feb. 21	689,553	June 20	812,578	Oct. 24	804,413
Feb. 28	668,805	June 27	818,450	Oct. 31	780,863
Mar. 7	685,016	July 4	670,232	Nov. 7	747,868
Mar. 14	700,108	July 11	721,454	Nov. 14	727,058
Mar. 21	701,142	July 18	791,414	Nov. 21	725,732
Mar. 28	715,337	July 25	780,705	Nov. 28	596,230
Apr. 4	704,517	Aug. 1	793,754	Dec. 5	662,035
Apr. 11	721,139	Aug. 8	785,349	Dec. 12	.....
Apr. 18	751,628	Aug. 15	807,387	Dec. 19	.....
Apr. 25	779,804	Aug. 22	817,431	Dec. 26	.....
		Aug. 29	818,461		

Association of American Railroads

* Estimated

PURCHASING POWER OF THE DOLLAR

(1947-1949=100)



AS MEASURED BY:	Wholesale Prices	Consumers' Prices	Retail Food Prices
1953*	90.9	87.7	88.8
Jan.	91.0	87.8	88.4
Feb.	91.2	88.2	89.7
Mar.	90.9	88.0	89.5
Apr.	91.4	88.0	89.7
May	91.1	87.7	89.2
June	91.3	87.3	88.0
July	90.2	87.2	87.9
Aug.	90.4	87.0	87.6
Sept.	90.1	86.8	87.9
Oct.	...	...	...
Monthly Averages			
1952	89.6	88.1	87.3
1951	87.1	90.1	88.8
1950	97.0	97.3	98.8
1949	100.8	98.2	100.0
1948	95.8	87.3	94.1
1947	103.7	104.7	104.3
1946	127.1	119.9	128.6
1945	145.3	130.0	145.1
1944	147.9	133.0	148.4
1939	199.6	168.4	212.3

U. S. Office of Business Economics

National Income

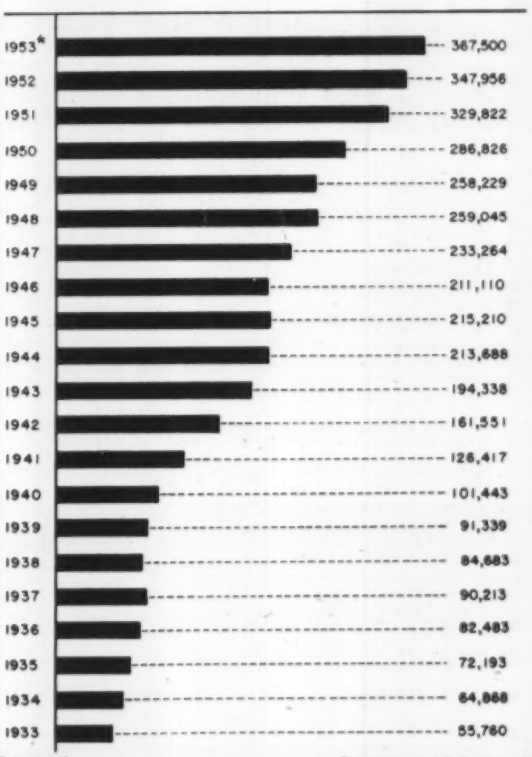
(Millions of Dollars)

1953*	305,000
1952	291,629
1951	278,373
1950	240,632
1949	216,259
1948	223,469
1947	198,688
1946	180,286
1945	182,691
1944	183,538
1943	169,686
1942	137,119
1941	103,834
1940	81,347
1939	72,532
1938	67,375
1937	73,627
1936	64,719
1935	56,789
1934	48,613
1933	39,584
1932	41,690

Dept. of Com.
* Estimated.

GROSS NATIONAL PRODUCT OR EXPENDITURE

(Millions of Dollars)



* Estimated. Department of Commerce

U. S. Revenues, Expenditures, Debt

Year	Net Receipts 000,000	Per Capita Receipts	Expenditures 000,000	Per Capita Expenditures	Gross Debt 000,000	Per Capita Debt
1953	$65,219	$408.45	$74,608	$467.76	$266,071	$1667.60
1952	62,129	396.31	66,146	421.93	259,105	1652.77
1951	48,142	312.36	44,632	289.59	255,222	1655.97
1950	37,043	244.42	40,167	265.03	257,357	1698.13
1949	38,246	256.68	40,057	268.83	252,770	1696.44
1948	44,746	306.24	36,326	248.61	252,292	1726.68
1947	44,703	311.77	42,505	296.44	258,376	1801.94
1946	43,037	305.25	65,018	461.17	269,422	1910.97
1945	46,456	332.78	100,404	719.25	258,682	1853.01
1944	44,149	319.92	93,743	679.29	201,003	1455.52
1943	22,281	163.25	78,182	572.83	136,696	1001.55
1942	12,799	95.25	32,491	241.80	72,422	537.35
1941	7,607	57.29	12,774	74.16	48,961	367.54
1940	5,387	44.09	9,127	70.65	42,967	325.63
1939	5,164	43.21	8,765	70.65	40,445	308.34
1938	5,854	47.89	7,304	59.70	37,167	285.43
1937	5,028	40.93	8,281	62.69	36,427	281.82
1936	4,115	32.17	9,068	69.41	33,545	261.20
1935	3,800	29.88	7,583	58.00	28,701	225.67
1934	3,115	24.64	6,370	56.19	27,053	213.65
1933	2,079	16.54	4,325	40.91	22,538	179.21
1932	2,005	16.06	4,948	41.28	19,487	155.93
1931	3,190	25.70	4,091	32.99	16,801	135.37
1930	4,177	33.01	3,994	32.42	16,185	131.49
1929	4,033	33.19	3,848	31.67	16,931	139.40
1928	4,042	33.73	3,643	30.40	17,604	146.69
1927	4,129	34.94	3,493	29.56	18,510	156.04
1926	3,962	33.98	3,584	30.76	19,643	167.70
1925	3,780	32.91	3,529	30.73	20,516	177.82
1924	4,012	35.44	3,507	30.98	21,251	186.86
1923	4,007	35.93	3,697	33.15	22,349	200.10
1922	4,109	37.40	3,795	34.54	22,964	208.97
1921	5,625	51.98	5,538	51.18	23,976	221.09
1920	6,695	62.83	6,482	60.84	24,297	228.32
1919	5,152	49.07	18,523	176.40	25,482	240.09
1918	3,664	35.38	12,697	122.58	12,243	115.65

Annual Statements of the Treasury

Corporate Income, Taxes, Dividends

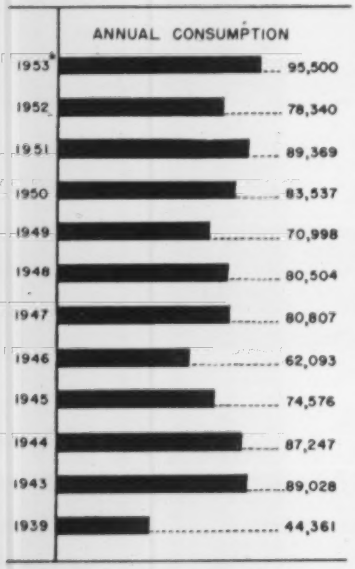
(All Industries—Millions of Dollars)

	Income Before Taxes	Taxes†	Income After Taxes	Dividend Payments	Undistributed Income
1953§					
1st Qtr.	44,600	24,400	20,300	.....	.....
2nd Qtr.	45,900	25,000	20,800	.....	.....
1952	39,216	20,635	18,581	9,107	9,474
1951	43,663	23,595	20,068	9,208	10,860
1950	40,976	18,247	22,729	9,125	13,604
1949	27,107	10,817	16,290	7,469	8,821
1948	33,762	13,028	20,734	7,250	13,484
1947	30,489	11,940	18,549	6,561	11,988
1946	23,464	9,583	13,881	5,808	8,073
1945	19,717	11,215	8,502	4,699	3,803

† Federal and state corporate income and excess profits tax liability
§ Seasonally adjusted quarterly totals at annual rates
Department of Commerce.

IRON ORE

(Lake Superior)



1953-1952 By Months

Thousands of Gross Tons

Consumption at U. S. and Canadian furnaces, Stocks at U. S. and Canadian furnaces and at Lake Erie docks.

	Consumption		Stocks	
	1953	1952	1953	1952
Jan.	8,293	7,527	37,077	35,927
Feb.	7,396	7,233	29,949	29,207
Mar.	8,257	8,022	22,065	21,451
Apr.	7,764	6,642	21,572	19,592
May	8,358	6,950	26,247	25,904
June	8,056	1,405	32,070	27,170
July	8,239	1,544	38,829	27,388
Aug.	8,150	7,276	45,579	34,137
Sept.	7,699	7,657	51,767	41,532
Oct.	8,142	8,038	55,700	47,839
Nov.	.....	7,826	.....	51,208
Dec.	.....	8,220	.....	45,172
Total	.....	78,340	.....	.....

Lake Superior Iron Ore Association

Iron Ore Production

All U. S. Districts

Thousands of Gross Tons

	1953	1952	1951	1950	1949
Jan.	3,387	3,704	3,812	2,777	2,920
Feb.	3,214	3,605	3,315	2,492	2,882
Mar.	4,113	3,714	3,525	2,496	4,335
Apr.	9,971	9,073	8,795	2,999	9,889
May	14,287	13,693	14,362	10,740	11,865
June	15,368	1,552	14,932	12,355	12,923
July	15,719	2,783	15,103	13,477	12,757
Aug.	15,473	14,974	15,832	14,478	11,986
Sept.	15,143	15,912	14,764	13,887	10,164
Oct.	.....	14,271	13,900	12,999	709
Nov.	.....	9,448	7,052	7,401	2,049
Dec.	.....	3,260	3,682	3,362	2,816
Total	.....	85,989	119,074	99,463	85,295

U. S. Bureau of Mines

Coke Production

Net Tons

	Oven	Beehive	Total
1953*	.....	.....	78,775,000
Jan.	6,284,493	483,321	6,767,814
Feb.	5,681,110	450,974	6,132,084
Mar.	6,298,960	536,350	6,835,310
Apr.	6,031,864	506,613	6,538,477
May	6,282,657	538,923	6,821,580
June	6,127,421	486,193	6,613,614
July	6,340,286	410,095	6,750,381
Aug.	6,311,134	413,645	6,724,779
Sept.	6,032,478	369,501	6,401,979
Oct.	.....	.....	.....
Nov.	.....	.....	.....
Dec.	.....	.....	.....

	Oven	Beehive	Total
1952	63,850,100	4,404,000	68,254,100
Jan.	6,186,700	625,000	6,811,700
Feb.	5,787,900	574,000	6,361,900
Mar.	6,221,300	563,100	6,784,400
Apr.	5,389,700	414,000	5,803,700
May	5,556,200	400,200	5,956,400
June	2,368,600	113,100	2,481,700
July	2,311,300	59,300	2,370,600
Aug.	5,808,300	220,500	6,028,800
Sept.	5,804,800	354,900	6,159,700
Oct.	6,137,900	302,400	6,440,300
Nov.	5,986,700	345,100	6,331,800
Dec.	6,290,700	432,400	6,723,100

YEARLY TOTALS

	Oven	Beehive	Total
1953*	.....	.....	78,775,000
1952	63,850,100	4,404,000	68,254,100
1951	71,987,200	7,343,500	79,330,700
1950	66,890,618	5,827,420	72,718,038
1949	60,222,481	3,414,948	63,637,429
1948	68,284,357	6,577,571	74,861,928
1947	66,758,549	6,687,301	73,445,850
1946	53,929,447	4,568,401	58,497,848
1945	62,094,288	5,213,893	67,308,181
1944	67,064,795	6,973,022	74,037,817
1943	63,742,676	7,933,387	71,676,063
1942	62,294,909	8,274,035	70,568,944
1939	42,882,313	1,444,328	44,326,641

U. S. Bureau of Mines
* Estimated.

Iron Ore Imports

Thousands of Gross Tons

	1953	1952	1951	1950	1949
Jan.	681	659	622	601	371
Feb.	576	624	573	509	391
Mar.	576	674	661	579	386
Apr.	780	657	741	334	560
May	966	699	834	678	650
June	1,125	860	1,255	893	642
July	1,148	726	1,083	792	946
Aug.	1,109	847	1,049	852	1,025
Sept.	.....	1,172	848	928	968
Oct.	.....	1,065	1,105	964	458
Nov.	.....	1,012	740	735	655
Dec.	.....	746	656	386	348
Total	.....	9,771	10,147	8,251	7,400

U. S. Bureau of the Census

Fluorspar

Net Tons

	Production	Imports	Consumption	Stocks†
1953				
1st Q.	78,308	71,831	149,880	251,168
2nd Q.	.....	.....	.....	.....

YEARLY TOTALS

	Production	Imports	Consumption	Stocks†
1952	346,315	352,503	521,500	277,639
1951	341,300	181,275	497,012	182,409
1950	283,500	164,634	426,121	183,723
1949	236,400	95,619	345,221	167,660
1948	336,000	111,626	406,269	184,213
1947	343,700	78,379	376,138	147,251
1946	277,300	29,488	303,190	117,620

U. S. Bureau of Mines † End of period

Iron & Steel Scrap

Thousands of Net Tons

CONSUMPTION

	1953			1952		
	Home	Purchased	Total	Home	Purchased	Total
Jan.	3,579	3,429	7,008	3,426	3,123	6,549
Feb.	3,343	3,156	6,499	3,215	3,026	6,241
Mar.	3,724	3,597	7,321	3,407	3,204	6,611
Apr.	3,585	3,390	6,974	3,027	2,977	6,004
May	3,572	3,478	7,050	3,034	2,980	6,014
June	3,489	3,176	6,665	985	1,309	2,295
July	3,295	2,909	6,204	906	1,295	2,201
Aug.	3,384	2,896	6,280	3,060	3,067	6,127
Sept.	.....	.....	.....	3,270	3,207	6,477
Oct.	.....	.....	.....	3,573	3,434	7,007
Nov.	.....	.....	.....	3,444	3,231	6,676
Dec.	.....	.....	.....	3,490	3,330	6,820

CONSUMERS' STOCKS†

	1953			1952		
	Home	Purchased	Total	Home	Purchased	Total
Jan.	1,314	5,317	6,632	1,166	3,190	4,356
Feb.	1,295	5,427	6,722	1,153	3,544	4,697
Mar.	1,248	5,321	6,569	1,178	3,894	5,072
Apr.	1,295	5,400	6,694	1,236	4,238	5,473
May	1,343	5,260	6,603	1,263	4,598	5,861
June	1,344	5,051	6,395	1,272	4,973	6,245
July	1,451	5,109	6,560	1,299	5,291	6,590
Aug.	1,564	5,295	6,859	1,379	5,648	7,027
Sept.	.....	.....	.....	1,388	5,658	7,045
Oct.	.....	.....	.....	1,428	5,605	7,033
Nov.	.....	.....	.....	1,350	5,586	6,936
Dec.	.....	.....	.....	1,329	5,581	6,910

MONTHLY AVERAGES

	Consumption		Consumers' Stocks†
1953*	6,850	1953*	7,500
1952	5,752	1952	6,104
1951	6,395	1951	4,472
1950	5,740	1950	5,272
1949	4,528	1949	5,631
1948	5,414	1948	4,980
1947	5,072	1947	3,966
1946	4,124	1946	3,757
1945	4,683	1945	4,073
1944	5,112	1944	5,268
1943	5,138	1943	6,170
1942	5,022	1942	4,550
1941	4,934	1941	4,529
1939	3,027	1939	5,310

U. S. Bureau of Mines † End of month

Scrap Consumption by Industries

Thousands of Net Tons

	Makers of Steel Ingots and Castings[1]		Makers of Steel Castings[2]		Iron Foundries and Misc.		Total	
	1953	1952	1953	1952	1953	1952	1953	1952
Jan.	5,682	5,139	367	367	998	1,042	7,047	6,549
Feb.	5,182	4,917	322	341	995	983	6,499	6,241
Mar.	5,871	5,283	351	347	1,100	981	7,322	6,611
Apr.	5,511	4,599	354	367	1,109	1,038	6,974	6,004
May	5,676	4,691	320	354	1,054	969	7,050	6,014
June	5,318	1,097	314	313	1,034	885	6,666	2,295
July	5,063	1,297	262	250	879	654	6,204	2,201
Aug.	5,130	4,997	276	319	909	811	6,315	6,127
Sept.	.....	5,210	.....	341	.....	926	.....	6,477
Oct.	.....	5,592	.....	383	.....	1,032	.....	7,007
Nov.	.....	5,469	.....	312	.....	895	.....	6,676
Dec.	.....	5,499	.....	337	.....	985	.....	6,821

1. Includes only those castings made by companies producing steel ingots.
2. Excludes companies that produce both steel castings and steel ingots.
U. S. Bureau of Mines

U. S. Electricity Production Capacity

Kilowatts

1953			
Jan.	82,377,847	July	86,113,668
Feb.	82,830,509	Aug.	86,634,002
Mar.	83,167,417	Sept.	87,588,024
Apr.	83,836,361	Oct.	.....
May	84,339,257	Nov.	.....
June	85,064,570	Dec.	.....

CAPACITIES AT YEAREND

1952	81,949,083	1948	56,559,838
1951	75,744,725	1947	52,322,067
1950	68,919,040	1946	50,316,621
1949	63,100,334	1945	50,110,928

Edison Electric Institute

Liquid Petroleum Gas Consumption in Steel Industry

Gallons

	Heating and Annealing	All Other	Total
1952	13,507,825	1,115,805	14,623,630
1951	15,560,057	1,006,255	16,566,312

Fuel Oil Consumption in Steel Industry

Thousands of Gallons

	Melting Furnaces	Heating, Annealing, etc.	Total
1952	1,579,960	660,165	2,240,125
1951	1,781,660	742,050	2,523,710
1950	1,618,723	675,481	2,294,204
1949	1,272,367	562,930	1,835,297
1948	1,533,129	662,410	2,195,539
1947	1,511,945	655,883	2,167,828
1946	1,225,904	557,276	1,783,180

American Iron & Steel Institute

ELECTRICITY OUTPUT

By Plants Contributing to Public Supply
Millions of Kilowatt-hours

1953—By Weeks

Jan. 3	7,713	May 2	7,939	Sept. 5	8,694
Jan. 10	8,210	May 9	7,897	Sept. 12	7,963
Jan. 17	8,121	May 16	7,959	Sept. 19	8,395
Jan. 24	8,144	May 23	8,013	Sept. 26	8,354
Jan. 31	8,151	May 30	7,956	Oct. 3	8,414
Feb. 7	8,129	June 6	8,096	Oct. 10	8,307
Feb. 14	8,147	June 13	8,245	Oct. 17	8,265
Feb. 21	8,196	June 20	8,329	Oct. 24	8,306
Feb. 28	8,070	June 27	8,446	Oct. 31	8,362
Mar. 7	8,173	July 4	7,915	Nov. 7	8,399
Mar. 14	8,138	July 11	8,096	Nov. 14	8,457
Mar. 21	8,078	July 18	8,209	Nov. 21	8,416
Mar. 28	8,075	July 25	8,460	Nov. 28	8,138
Apr. 4	8,019	Aug. 1	8,512	Dec. 5	8,582
Apr. 11	8,001	Aug. 8	8,464	Dec. 12	.....
Apr. 18	8,113	Aug. 15	8,514	Dec. 19	.....
Apr. 25	8,016	Aug. 22	8,432	Dec. 26	.....
		Aug. 29	8,539		

Edison Electric Institute and Federal Power Commission

YEARLY TOTALS

Millions of Kilowatt-hours

1953*	437,600
1952	398,924
1951	370,673
1950	329,141
1949	291,100
1948	282,698
1947	255,739
1946	223,178
1945	222,486
1944	228,189
1943	217,759
1942	185,979
1941	164,788

* Estimated

Industrial Coal Stocks

(Bituminous)

Thousands of Net Tons at End of Month

	1953	1952		1953	1952
Jan.	71,857	73,792	July	73,153	77,698
Feb.	70,110	74,967	Aug.	76,387	79,567
Mar.	69,187	76,042	Sept.	79,345	81,492
Apr.	69,473	76,810	Oct.	80,890	76,369
May	71,660	78,033	Nov.	.....	74,212
June	74,475	79,108	Dec.	.....	75,036

U. S. Bureau of Mines

Natural Gas Consumption in Steel Industry

Millions of Cubic Feet

	Melting Furnaces	Heating, Annealing	All Other	Total
1952	40,096	125,842	43,051	208,989
1951	44,669	126,380	35,748	206,797
1950	44,398	128,205	31,249	203,852
1949	36,542	96,319	30,180	163,041
1948	39,503	99,666	28,078	167,247
1947	34,708	90,220	24,008	148,936
1946	30,313	86,913	27,153	144,379
1945	32,613	94,547	20,926	148,086
1944	33,284	90,902	20,466	144,652

American Iron & Steel Institute

Bituminous Coal Consumption

Thousands of Net Tons

	Industrial Consumption		Retail Deliveries		Total	
	1953	1952	1953	1952	1953	1952
Jan.	33,428	34,895	7,996	9,389	41,424	44,284
Feb.	30,113	31,754	6,893	7,830	37,006	39,584
Mar.	31,840	32,167	5,756	7,070	37,596	39,237
Apr.	30,051	28,416	4,317	4,214	34,368	32,630
May	29,230	27,734	2,724	3,017	31,954	30,751
June	28,704	20,705	2,841	2,978	31,545	23,683
July	29,289	20,291	3,202	3,219	32,491	23,510
Aug.	29,478	27,423	4,019	5,212	33,497	32,635
Sept.	28,957	28,327	5,325	6,176	34,282	34,503
Oct.	.....	31,928	.....	6,936	.....	38,864
Nov.	.....	31,911	.....	5,056	.....	36,967
Dec.	.....	33,982	.....	7,296	.....	41,278

U. S. Office of Business Economics

Monthly Averages

	Industrial Consumption	Retail Deliveries	Total
1952	29,128	5,699	34,827
1951	32,562	6,343	38,905
1950	30,502	7,217	37,719
1949	29,530	7,525	37,055
1948	35,759	7,479	43,238
1947	37,087	8,264	45,350
1946	33,202	8,382	41,584
1945	36,331	10,150	46,482
1939	25,254	5,964	31,218

U. S. Bureau of Mines

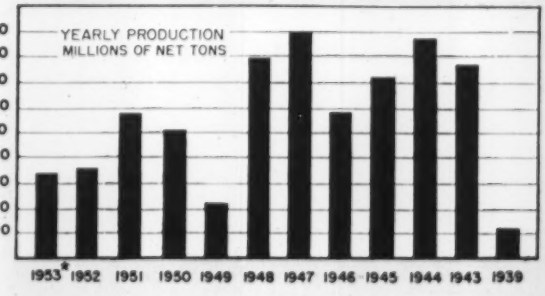
Natural Gas Sales

Millions of Therms

1953	Residential	Industrial, Commercial	Other	Total
1st Qtr.	6,757	8,855	637	16,249
2nd Qtr.	3,510	8,541	555	12,606
3rd Qtr.	.....	.....	.....	.....
4th Qtr.	.....	.....	.....	.....
1952				
1st Qtr.	6,484	8,034	428	14,946
2nd Qtr.	3,259	7,522	383	11,155
3rd Qtr.	1,345	7,621	634	9,600
4th Qtr.	4,175	8,489	929	13,593

American Gas Association

BITUMINOUS COAL OUTPUT



1953—By Weeks

Thousands of Net Tons

Jan. 3	7,695	May 2	8,750	Sept. 5	9,620
Jan. 10	9,600	May 9	8,850	Sept. 12	8,115
Jan. 17	9,560	May 16	9,125	Sept. 19	9,665
Jan. 24	9,210	May 23	8,785	Sept. 26	9,660
Jan. 31	8,875	May 30	8,850	Oct. 3	9,230
Feb. 7	8,570	June 6	9,135	Oct. 10	9,275
Feb. 14	8,350	June 13	9,350	Oct. 17	9,515
Feb. 21	8,550	June 20	9,820	Oct. 24	9,275
Feb. 28	8,500	June 27	10,010	Oct. 31	9,120
Mar. 7	8,100	July 4	1,630	Nov. 7	8,820
Mar. 14	8,460	July 11	6,910	Nov. 14	8,810
Mar. 21	8,120	July 18	9,150	Nov. 21	8,850
Mar. 28	8,256	July 25	9,160	Nov. 28	.....
Apr. 4	7,070	Aug. 1	9,250	Dec. 5	.....
Apr. 11	8,460	Aug. 8	9,365	Dec. 12	.....
Apr. 18	8,675	Aug. 15	9,535	Dec. 19	.....
Apr. 25	9,000	Aug. 22	9,570	Dec. 26	.....
		Aug. 29	9,745		

U. S. Bureau of Mines

* Estimated

Construction

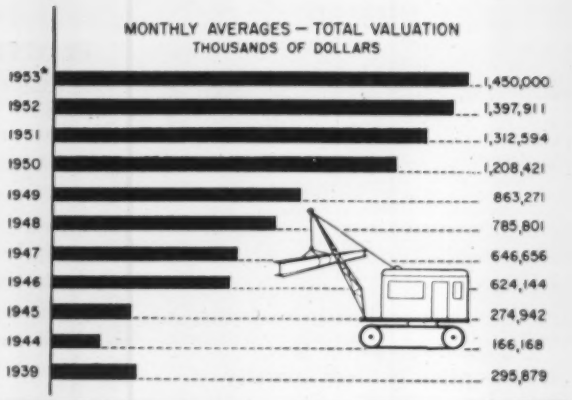
METALWORKING FACTS AND FIGURES

CONSTRUCTION VALUATION

37 States—Thousands of Dollars

	Total		Public Works, Utilities		Residential and Non-residential	
	1953	1952	1953	1952	1953	1952
Jan.	1,075,868	902,091	208,918	206,694	866,950	695,397
Feb.	1,021,310	885,206	228,421	187,364	792,889	697,842
Mar.	1,347,518	1,321,254	293,143	265,261	1,054,375	1,055,993
Apr.	1,741,542	1,597,517	387,325	353,647	1,354,217	1,243,870
May	1,606,091	1,563,660	386,309	347,042	1,219,782	1,216,618
June	1,115,509	1,488,850	193,195	355,558	922,314	1,133,292
July	1,793,342	1,511,285	375,542	340,521	1,417,800	1,170,764
Aug.	1,414,408	1,438,725	360,997	291,189	1,053,411	1,147,536
Sept.	1,741,673	2,039,203	450,977	248,365	1,290,696	1,790,838
Oct.	1,892,388	1,310,958	499,676	238,125	1,392,712	1,072,833
Nov.	.....	1,248,803	.....	258,898	.....	989,905
Dec.	.....	1,467,384	.....	319,704	.....	1,147,680
Total	.....	16,774,936	.....	3,412,368	.....	13,362,568

F. W. Dodge Corp.



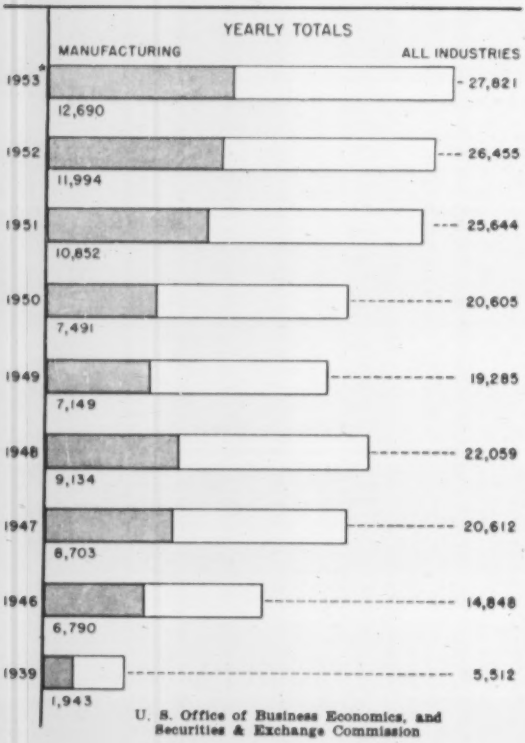
NEW PLANT AND EQUIPMENT EXPENDITURES

Millions of Dollars

(Figures do not necessarily add to totals, due to rounding.)

	Manufacturing		All Industries	
	1953	1952	1953	1952
1st Quarter	2,747	2,650	6,147	6,141
2nd Quarter	3,280	3,156	7,225	6,808
3rd Quarter	3,425	2,820	7,408	6,244
4th Quarter	3,239*	3,367	7,042*	7,265
Total	12,690*	11,994	27,821*	26,455

* Estimated



U. S. Office of Business Economics, and Securities & Exchange Commission

NEW HOUSES STARTED

(Permanent Nonfarm Dwellings—Cost Estimated in Thousands of Dollars)

	Number		Cost	
	1953	1952	1953	1952
January	72,100	64,900	$641,703	$566,665
February	79,200	77,700	720,234	682,895
March	105,800	103,900	984,276	918,099
April	111,400	106,200	1,057,899	949,001
May	108,300	109,600	1,027,221	1,006,552
June	104,600	103,500	974,001	964,633
July	96,000	102,600	920,787	945,587
August	94,000	99,100	.....	895,675
September	92,000	100,800	.....	920,654
October	88,000	101,100	.....	928,677
November	.....	86,100	.....	785,969
December	.....	71,500	.....	645,176
Total	1,100,000*	1,127,000	.....	$10,208,983

YEARLY TOTALS

	Number	Cost		Number	Cost
1953*	1,100,000	$.....	1948	931,600	$7,203,119
1952	1,127,000	10,208,983	1947	849,000	5,642,798
1951	1,091,300	9,800,538	1946	670,500	3,769,767
1950	1,396,000	11,788,595	1941	141,800	495,054
1949	1,025,100	7,702,971	1941	706,100	2,825,895

U. S. Bureau of Labor Statistics

FABRICATED STRUCTURAL STEEL

Tons

	Orders Placed			Shipments		
	1953	1952	1951	1953	1952	1951
January	266,944	213,110	361,373	241,392	244,947	214,000
February	180,882	230,832	256,746	251,137	246,398	193,638
March	258,482	226,394	297,517	266,337	268,840	237,087
April	306,052	209,106	337,026	263,211	230,670	234,095
May	310,517	209,888	268,166	263,806	244,222	234,486
June	232,441	167,492	207,966	274,587	125,486	257,066
July	220,669	221,559	222,540	230,304	138,267	204,380
August	244,607	252,849	212,730	251,109	226,277	236,915
September	217,600	207,695	188,187	255,599	227,595	228,296
October	191,180	184,331	183,921	289,755	262,730	240,056
November	.....	144,001	192,065	.....	223,662	219,564
December	.....	236,264	202,835	.....	225,161	202,679
Total		2,503,521	2,931,072	.....	2,661,255	2,702,262

	Orders Placed	Shipments
1950	3,165,579	2,275,885
1949	1,784,981	2,159,343

American Institute of Steel Construction

Industrial Building Cost Index

(1914=100)

	1953	1952	1951	1950	1949	1948
First Quarter	383	374	357	305	319	310
Second Quarter	385	383	373	311	313	325
Third Quarter	392	383	374	330	307	327
Fourth Quarter	.....	383	374	339	307	323

MONTHLY AVERAGES

1953*...	383	1950...	321	1947...	304	1944... 227	1941... 208
1952...	381	1949...	312	1946...	279	1943... 225	1940... 193
1951...	370	1948...	321	1945...	236	1942... 223	1939... 190

Aberthaw Co.

* Estimated

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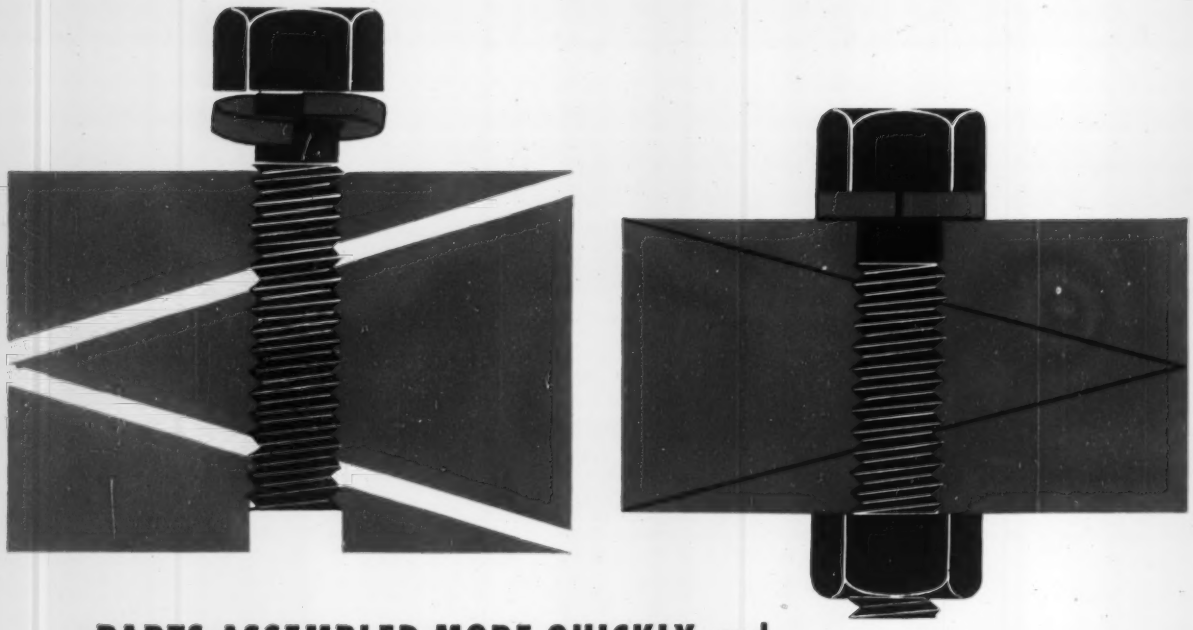
DESIGN FOR FASTER PRODUCTION



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STEEL's 1954 FORUM ON TECHNICAL PROGRESS

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The nice part about this trip is that you will spend no time traveling, rushing for planes or trains, or waiting for your appointments. The men you want to talk to are waiting for you on succeeding pages, and you won't even have to leave your chair.

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TECHNICAL PROGRESS

Steelmaking

IN a year destined to see a return to the more-normal 80 to 90 per cent operating level, three topics of conversation predominate wherever steelmakers gather: Open hearths vs. electric furnaces, 100 per cent sinter burdens in blast furnaes and top-blown oxygen bessemer practice.

Looking at the first realistically, it is inconceivable that the large hot metal shops which are basic to the biggest volume of steel production will ever be replaced by electrics. On the other hand, electricity is a raw material whose cost has remained almost fixed in a period when all others have risen. If this trend continues, along with additional furnace development, electrics could move into the picture at a greatly accelerated rate.

Blast furnace coking rates in the neighborhood of 1200 pounds per ton of sinter and increases of 30 to 40 per cent in furnace output speak well for the 100 per cent sintered ore practice. Question for the immediate future, however, is whether or not the slackened level of operation in the industry will be able to foot the high cost of sintering plants.

After a period of comparative dormancy, the bessemer seems destined for a new role. Using top-blown oxygen, two of these new units will go to work in this hemisphere in 1954. Results of work performed in Austria prove the units can produce steel equivalent to the best open hearth grades, and at less cost all the way around.

Industry men look to 1954 as a year of intensified cost cutting after the somewhat lax days of peak production. Demand for higher quality steels will put the pressure on raw materials, refractories and mill equipment suppliers as well as plant personnel. Far from being a slow year, 1954 will be recorded as a year of high production and general industry-wide toning of production muscles.

Mr. Reinartz

Many new open hearth furnaces tapping from 200 to 300 tons per heat have been erected in recent years. They are equipped with more and better controls; infiltration of the air has been decreased; fuel consumption has shown considerable decrease, and the quality of the product has not been affected adversely.

Handling of brick for repairs and auxiliary materials in furnace operation and maintenance have been greatly improved. Much work has been done to improve combustion control. Still more can be done in use of better burners and better control of flame; increased pre-heat temperature of air for combustion; and perhaps, most important, training the furnace operating personnel how to use these controls most effectively.

Those managements, which have seen the wisdom to make use of combustion observers on each turn, and who have developed a procedure to regulate the use of fuel in a rational manner, have made the most progress in production per month per furnace and in fuel conservation.

Mr. Davis

Complete figures are not yet available but indications are that total Lake Superior shipments will exceed 90 million tons, the Mesabi open pits again carrying the brunt of the load. The question is often asked, "How much longer can this keep up?" "What are we to do when the Mesabi open pits are exhausted?" Actually, plans are underway to hold Mesabi shipments at some place near the present 50 million-ton mark for at least another fifty years.

This is to be done by expanding taconite production to take the place of the diminishing production of the present types of Lake Superior ore. Tangible evidence is to be seen at Babbitt, Aurora, Virginia, Mountain Iron, and Mesaba on the Mesabi Range; at Beaver Bay and Two Island River on Lake Superior; and at Humboldt and Republic on the Marquette.

Present plant operations and new constructions now under way or scheduled, indicate increasing annual shipments in millions-of-tons of taconite concentrate and its products, beginning this year and continuing annually as follows: 1/3, 2/3, 2½, 3¾, 6, 7½, 8, 11½, and by 1970, 32½ million tons. This rapid expansion of taconite production, coupled with the fact that, if need be, much greater expansion is possible, assures us of an adequate domestic supply of high-grade, blast furnace ore, far into the future.

Mr. Cashin

Basic refractories made for specific uses in open hearths and electric furnaces, rather than all-purpose refractories, will come under closer scrutiny by the cost-conscious steel industry in 1954.

As specialists in the behavior of basic refractories in this most critical phase of steel making, this company finds that the demand is generally for a combination of optimum refractory products plus a more exacting application of those products. This is in order to meet different temperature and metallurgical problems peculiar to individual zones in the furnace.

This trend is supported by a marked increase in the use of bottom ramming materials of higher MgO content, or more explicitly for bottoms in place containing maximum amount of MgO per unit volume. Such bottoms spell the economy that steel plant experts are looking for today. They are cheaper to maintain, incur less down time for repairs and, consequently, produce more steel.

There is no substitute for consumers' furnaces as the ultimate proving ground, and product development must continue to be directed by a close liaison with the users technical and operating departments.

Mr. Murphy

For the steel industry, 1953 was a year in which past gains in both physical plant and operational methods were consolidated. The additions to basic steelmaking capacity were nearly completed, including the necessary blast furnaces, coke ovens and coal and ore handling facilities. These have all required "shakedown cruises" to train new personnel and work out rough spots.

For old and new units alike, steady progress has been made in increasing furnace availability by decreasing down time for rebuilds and warmups. Major factors have been the blasting of slag pockets permitting earlier access to cellar work and more mechanization of materials handling from and to the furnace site.

A trend toward increasing use of gas, both coke oven and natural, in firing open-hearth furnaces has been developing. Coke oven gas is being

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Buffalo, N. Y.

S. M. SWAIN
Director of Research
North American Refractories Co., Cleveland

H. S. NEWHALL
Division Manager, Pittsburgh Lectromelt
Furnace Corp., Pittsburgh

used in some plants at pressures higher than usual to some advantage in melting. In general, increasing effort is being spent in making more effective use of existing knowledge of combustion, especially as it pertains to the development of large quantities of high temperature heat, so vital to the open-hearth process.

Mr. Old

While the higher-iron-content Lake Superior ores will continue to be the primary source of supply for the blast furnace, foreign ores and taconite concentrates will be made available to the steel industry in large quantities. Will the steel mills of the future be located on the Atlantic seaboard where shipping costs of foreign ores can be minimized? Or will the existing mills in the Great Lakes region, provided with Labrador ores and sized agglomerates manufactured from Minnesota taconites, be able to produce more pig iron from existing facilities at coke rates which today are unattainable?

Another development which may affect the location of future plants is the low shaft blast furnace. The experimental furnace now operating at Liege, Belgium, is expected to determine the economic feasibility of smelting raw materials, too poor in quality for the conventional blast furnace, in a low shaft furnace using an oxygen-enriched blast and elevated top pressures. If this experiment proves successful, it could well result in adequate supplies of less expensive steel for areas which today must import all their steel.

Mr. Newhall

It has taken the electric furnace fifty-odd years to come this far in the competitive production of plain carbon steels, but it is now passing through that transition stage where a very rapid growth is taking place every year, and it will not be many years before the electric furnace will assume its leading role in the steel industry.

In order to bring about this advancement in the electric furnaces it has been necessary to obtain the co-operation of many other industries, and this co-operation has been gladly given with the result that furnaces today operate with far superior refractories, electrodes, electric controls, switchgear, and many other parts.

The largest furnaces in the world have been put into production lately but even before these furnaces were in operation still larger furnaces were on the drawing board, and it is expected that 150-ton and larger size units will soon be installed. This brings up a very controversial question between the economics of the open-hearth and the electric. Production costs today have indicated that the electric furnace has won the first round in costs and many interesting discussions will follow this year.

Mr. Savage

During the year 1953 the coke capacity of the chemical type coke ovens increased from 75,000,000 tons at the start of the year to 80,000,000 tons at the year end. This 5,000,000 ton increase was the result of the completion of 7,000,000 tons of new coke capacity, less a drop of 2,000,000 tons caused by the abandonment of obsolete ovens. This huge capacity, together with 6,000,000 tons of beehive coke capacity, seems to provide approximately enough coke for full capacity operations of our blast furnaces and foundries, and for industrial uses.

However, approximately 35% of our coke capacity is made in chemical type ovens having an age of 25 years or more. It will be necessary to replace these ovens at the rate of approximately 5,000,000 tons of capacity a year to maintain our balance, even if no new blast furnace capacity is added.

After a long period of coal chemical shortages, the industry is again in a buyers' market for many of its products. In 1954 it will be necessary for the industry to deliver high quality of products and services, and to see that these products are sold by a well informed and energetic sales staff.

Mr. Swain

Steel mills are using higher operating temperatures, faster schedules on furnaces and more fluxes to speed the operations or make them more uniform. Accordingly, refractories are being selected from higher temperature or more resistant groups and there is a continuation of the trend to use two or more different kinds of brick in any one furnace.

The greater interest in the use of high alumina brick should grow in the future in view of the improvements being made in density, strength and resistance to fluxing action. In the case of silica brick there is a continuation of the trend for improvement in purity and in the physical characteristics of the brick which result in more adequate strength and superior toughness combined with high purity.

There has been and will continue to be much more attention paid to the mortars to be used with brick of all types. If expensive brick are employed on a particular service it is important that mortar of equal quality be used in order that the full value of the refractories be obtained.

There are being placed on the market and subjected to service tests a variety of high temperature refractories. These materials are being applied for special uses such as burner blocks, feed holes, tap-out blocks, pyrometer blocks and similar applica-

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tions where retention of shape and resistance to slag and resistance to spalling are extremely important. While the unit cost of these special refractories is high, the savings in uninterrupted operation of the furnace gives large over-all savings in costs of product treated.

Mr. Barrett

Insulating the outside walls of the checker chambers and slag pockets as well as the roofs of these chambers on open hearth furnaces with the BRI Gun and suitable insulating materials has resulted in the saving of costly Btu's. A coating of insulating materials on these walls and roofs can be accomplished by air emplacement with speed and ease, whereas other methods have proved costly and at times impossible.

In many instances additional heats have been obtained from open hearth furnaces by making gun repairs to brickwork inside the slag pockets, around the arches, and against the chill plates. Air emplacement of refractories is a convenient if not the only method of repairing these areas in an operating furnace.

New soaking pit cover linings are installed quickly and easily with the gun during rebuilds, whereas maintenance of the pit walls and coping can be carried on without disrupting the normal operating schedule. It has also been found beneficial to gun-insulate the outside of the soaking pit checker chambers using the same technique for open hearth checker chambers.

Mr. Patterson

Higher strip rolling speeds, with the attendant stiffer downtime costs will cause more and more steelmakers to examine the factors that contribute to downtime charges. In the hunt for causes of inefficiency in strip mills, work rolls are coming for their share of scrutinizing. Good roll performance and sound inventory practice often can greatly improve a mill's efficiency.

Rollmakers in the coming months will continue their efforts to give the rolling mill operators even better rolls than they are getting today. Manufacturing methods and metallurgical concepts are constantly being reviewed.

One heat treating technique in particular is expected to get more attention in 1954. The treatment creates physical properties in cast alloy iron work rolls, which permit a single-hardness roll to be used in all stands of a hot strip mill finishing train. Heretofore, spare rolls of two or three different hardnesses had to be stocked for the various finishing stands.

The process consists of casting the roll at high scleroscopic hardness and then drawing it back to 76/78 scleroscope. The roll is being used successfully in regular production in several of the country's leading strip steel mills.

Mr. Loutzenhiser

There has been quite a bit of controversy in electric furnace melt shops throughout the country as to the amounts or percentages of recovery in the different alloys when used in the form of alloy scrap. The foremost of these, I believe, is the Mn and Cr recovery on a remelt heat of 18 per cent Mn, 16 per cent Cr and 1 per cent Ni.

Why make remelt heats of this analysis at all? Why not make virgin heats on this grade? Virgin heats are not detrimental to refractories and bottoms, and conversion cost savings are realized by cutting down heat time and eliminating bottom repairs. The first question that arises is, what to do with the scrap or the discard of the 18-16-1 ingots after they have been rolled?

Majority of electric furnace melt shops (or should I say the entire electric furnace alloy steel industry that has had the occasion to make the high Mn Cr steels) is also in the 18-8 stainless market. Here then is the answer to the problem: On 18-8 remelt heats, the majority of melt shops uses a cool-off scrap consisting of 18-8 crops after the oxygen blow-down period. In place of 18-8 crops, they use the 18-16-1 crops, thereby getting practically 100 per cent recovery on the Mn and the Cr. This has been tried and proved successful time and time again.

Mr. Birch

The refractories industry essentially completed the post-Korean expansion program which leaves it in a greatly improved position for handling the demands of an expanded steel industry.

One of the more interesting developments was the introduction of a super-quality semisilica brick which, in this field, may have an effect similar to the introduction during the last war of a super duty silica brick. This product, in the 75 per cent silica class, is noted chiefly for its volume stability under load and for the absence of structural spalling which is ordinarily due to vitrification. This refractory will find its market wherever resistance to sustained load at high temperatures is a factor, as in blast furnace stoves and open hearth regenerator roofs.

The trend towards the use of hard fired brick for blast furnace linings continued, and progress was made in the art of co-ordinating the use of such refractories with carbon. There was increased use of hard fired super duty fireclay brick for lining iron transport ladles and these refractories have now become recognized as the standard for this service in many plants.

Many steel plant operators have

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Union Carbide & Carbon Corp., New York

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Special Consultant, Allegheny Ludlum
Steel Corp., Brackenridge, Pa.

G. V. SLOTTMAN
Vice President
Air Reduction Co., Inc., New York

W. E. MILLER
Manager, Steel Mill Engineering
General Electric Co., Schenectady, N. Y.

extended their use of plastic firebrick, castables and gunning mixes. There was a special interest in the use of furnace sealing mixtures frequently applied by gunning.

Mr. Holub

Powder-scarfing of cold stainless steel is being employed at a steadily increasing rate in the conditioning of ingots, blooms, slabs and billets of both the chromium-nickel and straight chromium type steels. The flexibility and cost advantage of powder-scarfing over mechanical methods of defect and surface removal are today being realized by all principal stainless steel producers in conditioning the edges of sheet, plate and strip mill slabs.

This operation, which does not require an elaborate setup, is accomplished with hand blowpipes at 50 per cent the cost and up to six times faster than by mechanical methods. Although 80 per cent of today's powder-scarfing is carried out by hand, significant advances in nozzle development which have increased pass width and scarfing speed, improved scarfed quality and reduced scarfed metal loss, point the way toward mechanization, particularly for slab surface removal. Passes up to 6½ in. wide at lineal speeds up to 30 ft per min. are today being obtained in production operations. A machine to produce up to 10-in. wide passes has been built and will be in operation shortly.

Mr. Patterson

Electric furnaces will continue to make important contributions to science and progress in making alloys for atomic fission, jet propulsion and for electronics. The electric furnace has completely replaced the crucible furnace, and grown from a three-ton unit or less to a giant of more than 150 tons. We are seeing it compete with the open hearth favorably under certain conditions and on certain grades of steel.

There is little hope that the electric furnace will replace the open hearth as it did the crucible furnace but we should look for great changes in the next generation. They could involve combinations of arc heating or induction heating and induction stirring with flame heating and all sorts of exothermic reactions between oxygen and various heat producing elements. The use of oxygen to replace ore for oxidation has proved itself and is teaching us to use temperatures that we formerly thought were beyond our reach. It is possible that new processes will involve temperatures far beyond those which we consider high today. I believe that better electric furnaces will be built and better refractories will be perfected.

Mr. Slottman

Use of oxygen as a refining agent in producing open hearth and electric furnace steels is now a firmly established process. Oxygen refining has not only enabled shops to refine steel more rapidly, but it has given the operators a reliable tool for control of the refining cycle. Most open hearth shops producing low carbon steel use oxygen in routine production. Practically all electric furnace shops, whether producing ingots or castings, find the use of oxygen a satisfactory method for lowering production costs.

The use of oxygen for combustion in open hearth furnaces is not widespread, and in general is used only in mills operating furnaces with limited checker capacity. Some investigation of oxygen for open hearth combustion to maintain production rates during the latter part of a furnace campaign has been done in several shops.

It is still too early to assess the potential of the use of oxygen for producing steel directly from hot metal. The one installation in Canada, which is scheduled for next spring, will be watched closely for economics and for steel quality.

Mr. Miller

Today's steel plant economics—high labor cost and constant pressure for improvement in profit position—will speed the trend to greater automation. The modern electric feedback control system makes it possible to increase output, reduce unit cost and at the same time maintain or improve quality. Output can be increased by raising the operating speed because the electric regulating control system is continuously on the job checking performance against a reference or standard, and automatically correcting for any deviation from the desired condition.

Since it is the electric equipment that provides the automation, it is quite natural that we should continue to see an increase in the electrical content of processing machinery. System engineering will continue to become more important. Capital investment and mill output capabilities will be so great that as the scheduled start-up date approaches, management will not tolerate extended delays for rearrangement of electric circuits.

Steel mill management is becoming increasingly aware of the complexity of the electric systems that are required to achieve their requirements of high quality and yet ever higher production. Even though complex, so long as automation brings with it increased production, lower unit cost and improved quality,

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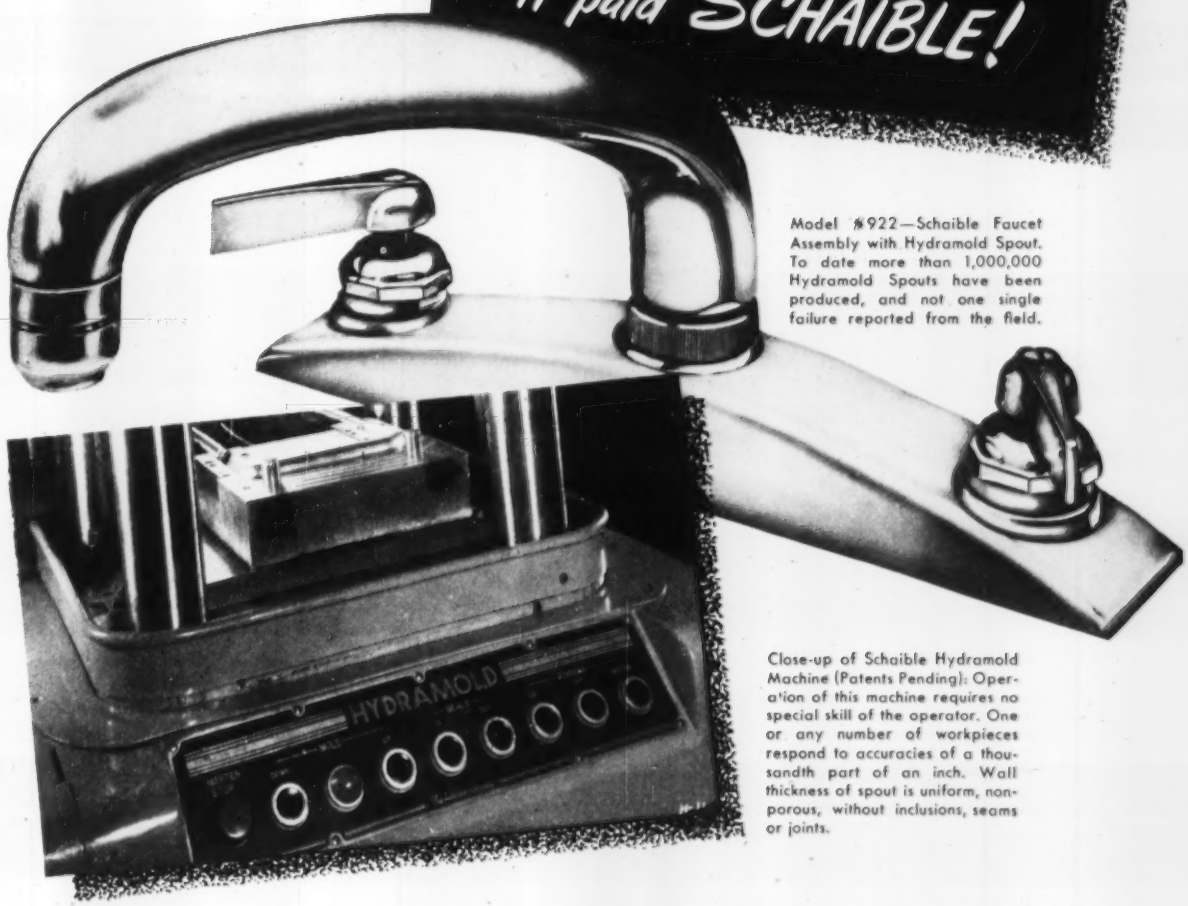

Model #922—Schaible Faucet Assembly with Hydramold Spout. To date more than 1,000,000 Hydramold Spouts have been produced, and not one single failure reported from the field.

Close-up of Schaible Hydramold Machine (Patents Pending): Operation of this machine requires no special skill of the operator. One or any number of workpieces respond to accuracies of a thousandth part of an inch. Wall thickness of spout is uniform, nonporous, without inclusions, seams or joints.

A brass that does not have to be "tailored" to a job, but is made with accuracy in normal mill procedures, meets the unusual material requirements that the Schaible Company has in its remarkable spout fluid forming process called Hydramold.

The Schaible Company, Cincinnati, Ohio, is one of the larger manufacturers of strainers, valves and faucets, who have been more progressive in product design and methods of manufacture. Schaible requirements are exacting as to product quality control. This is especially true of sources of material, and when the company developed, designed and built its four new Hydramold machines to manufacture modern spouts from tubular material, the specifications became most rigid.

This was where the Revere Technical Advisory Staff entered the picture. Revere technical men studied the Hydramold process developed by Schaible engineers, and the unusual forming requirements, thereby helping establish the exacting specifications so that the mill and manufacturer developed mutual material control and process information.

The Schaible Company has made more than one million spouts by this new method without a single field performance failure—better spouts, states Schaible, produced by more economical means than conventional casting methods.

Today, there may be more costly spouts, but according to Schaible "There is no better spout than the Schaible Hydramold formed spout."

This case study is another example of the value of close cooperation between Revere and an exacting customer. The more we know about what you make, and how you make it, the better we can serve you. See the nearest Sales Office.

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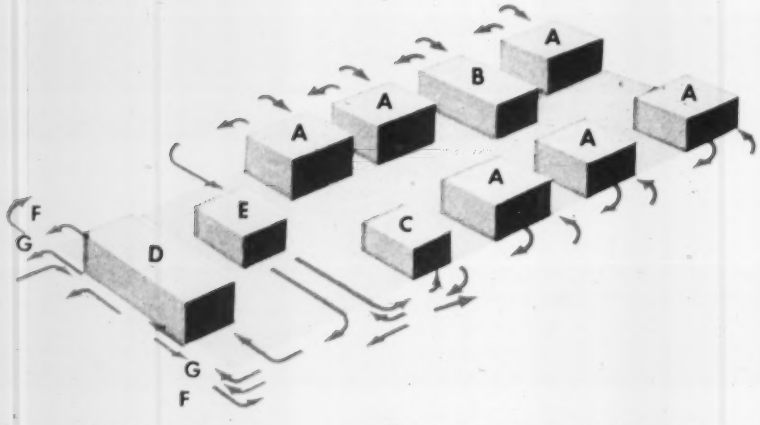
Heat Treat Furnace Layout

by *Holcroft*... 5th of a Series



- A 6 BATCH TYPE FURNACES
- B 1 HOT SALT QUENCH
- C 1 BATCH TYPE DRAW FURNACE
- D 1 CONTINUOUS DRAW FURNACE
- E 1 WASH MACHINE
- F 2 TWO-WAY TRANSFER CARS
- G 2 LOADING ELEVATORS

Multiple Batch Furnace Layout for Any Type of Heat Treating

This unusual furnace layout processes a number of parts requiring different types and cycles of heat treating. It is completely flexible.

The furnaces are now being installed in a midwestern plant, a decision made because captive heat treat departments—where high volume production is a "must"—are definitely economical.

Yes, the initial cost is high. After all, they are capital goods items. But, when all the returns are in, actual per-piece heat treating costs will be substantially lower!

Big jobs—little jobs—all jobs get the same careful engineering at Holcroft. It's a place where industry leaders go for answers. Write today—to be sure. Holcroft & Company, 6545 Epworth, Detroit 10, Michigan.

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Portsmouth, O.

E. W. EARHART
Metallurgical Engineer, Alan Wood Steel Co., Conshohocken, Pa.

use of such equipment in all industry will continue at an ever accelerating pace.

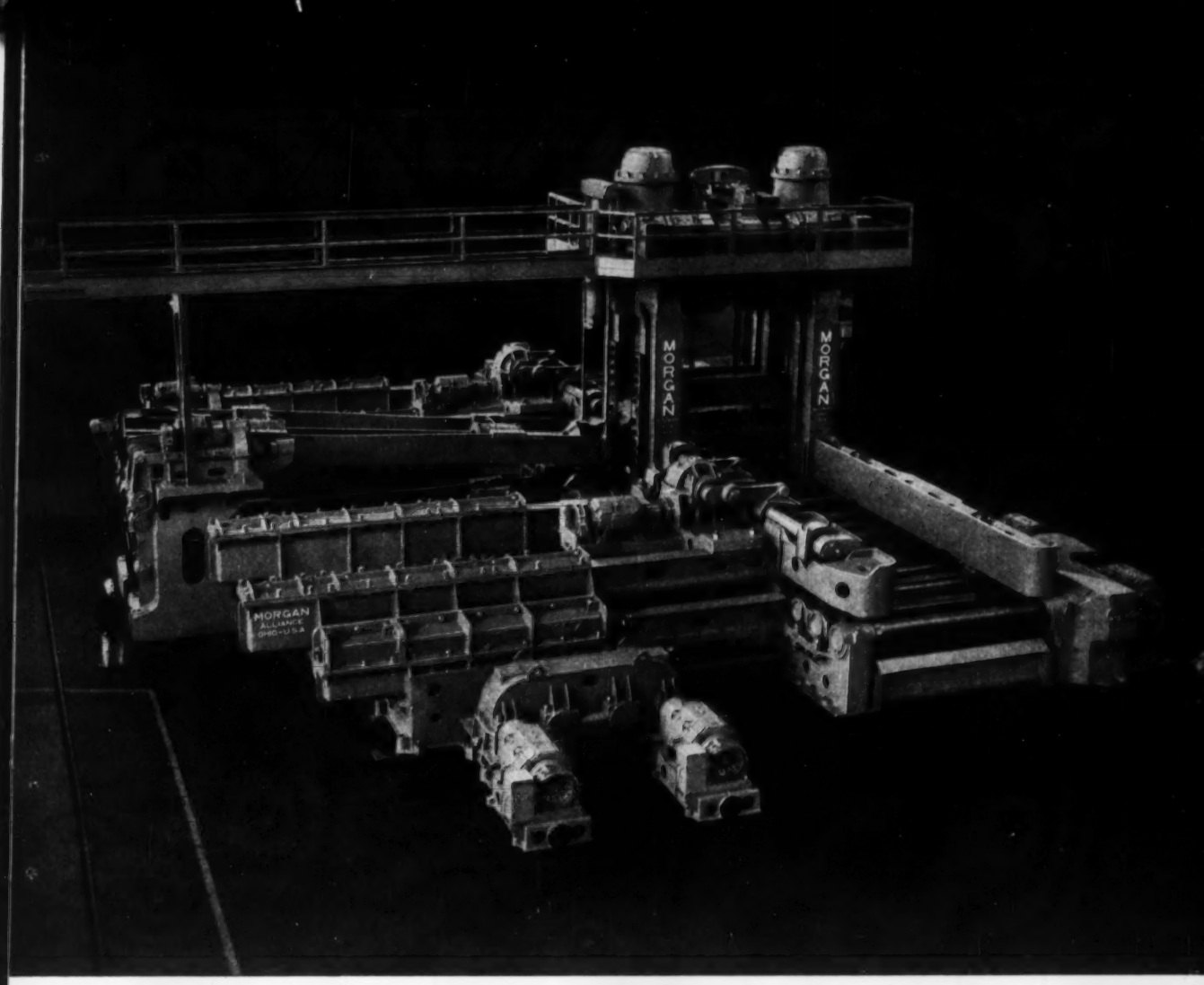
☑ Mr. Nordstrom

Economic conditions have given impetus to the trend toward automation in mass production industries. Several new plants have achieved a very high degree of automation, and there is every indication that plants now under construction or undergoing modernization will strive for even higher levels.

This major development will undoubtedly impose new and greater demands for higher quality in materials supplied to them, as the success of the program will depend largely upon the use of materials exhibiting greater uniformity in dimentional, chemical and physical characteristics than is now required. We, therefore, feel that basic steel producers will have to place emphasis upon an expanded program for the development of practices and controls that will insure consistent production to constantly increasing quality standards.

☑ Mr. Earhart

Incentive plans based primarily on quality factors are somewhat less



44" TWIN MOTOR DRIVE BLOOMING MILL

Morgan 44"—2 High Reversing Blooming Mill to be direct connected to two 4000-Hp., 50/120 Rpm. Motors. Top roll and both spindles are hydraulically balanced by individual cylinders connected to an air hydraulic system. Speeds of motor driven screw down, feed rollers, mill tables and manipulator are regulated by variable voltage control.

Mill tables have box type cast steel girders. Rollers are forged steel equipped with anti-friction type bearing cartridges. All gears have hardened teeth, are totally enclosed and operate in oil. Manipulator is of the electric overhead type with retractable heads affording maximum accessibility to all parts of the mill tables.

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E. H. BROWNING
Section Manager, Industry Engineering
Westinghouse Electric Corp., Pittsburgh

JAY J. SEAVER
Consultant
Chicago

common than those based on production, and the application of this type of incentive in a steel works melt shop is still more rare. Therefore, results obtained through application of a quality incentive system for open hearth melters may be of interest.

In establishing this plan, past performance was recognized and statistical standards established to govern compliance with ordered chemical ranges, prescribed furnace and pit practices and with temperature requirements (skulling).

Realistic standards were adopted and each melter's performance is evaluated monthly for each factor and a single weighted performance factor determined therefrom. Incentive compensation is based upon the differential between standard and actual quality performance.

That the plan is proving effective is evidenced by the following comparisons, in which the January to March, 1953, period is used as a base:

Heats accepted on Intended Order	Improved 1.4%
Heats downgraded a/c Furnace or Pit Practices	Decreased 21.1%
Heats with Excessive skulls	Decreased 50.7%
Skull Weight per Heat	Decreased 22.4%
Shop Productivity (Net Tons/ Furnace Hour)	Improved 3.2%

☑ Mr. Browning

Contacting type regulating equipment has given way to rotating type regulators which in turn are being replaced on many installations by magnetic amplifiers. There is a trend toward simplification of control as much as possible without sacrificing quality of performance. The use of magnetic amplifiers offers great possibilities since such equipment is static by nature and requires a minimum of maintenance.

Since in most physical processes higher speed means greater power required, power supply and electrical drive equipments are increasing in size. Every effort is being made to utilize equipment which offers the greatest advantage in each particular application from the standpoints of performance and economy.

Improvements made in electrical equipment design and application have contributed in large measure to the success of present-day steel producing operations. Such improvements will continue to be made in the future.

☑ Mr. Seaver

Consulting engineers are supposed to have vision and foresight enough to project new ideas and developments into the future in order to

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build better mouse traps tomorrow, than are built today. After these ideas and developments are made, then it becomes a bigger job to sell them to their clients.

The first open hearth furnace designed and built in this country was in 1869. The design and operation of open hearth furnaces built in our new shops is not much different today. On the other hand, electric furnace builders are making rapid strides and developments to improve their designs and operation. Controversy about competition of the electric furnace versus open hearth furnace for making steel continues, while the open hearth operators do little or nothing to improve their designs.

One thing all open hearth operators agree on is that they like to have high preheat. To obtain high preheat, it is necessary to have an efficient regenerator system with high heating surface. To get efficient regenerators with high heating surface, it is necessary to remove the solids from the products of combustion. Such a system is now available.

☑ Mr. Kingsbury

When the figures are totaled up, we will probably find that the shipments of blast furnace ore from the Lake Superior region for the year 1953 will exceed 90,000,000 gross tons. While this will not be the year of greatest shipment of ore from the Lake Superior region, it will constitute a heavy drain on the reserves of merchantable ore remaining in the Lake Superior region as of the start of this year.

During the past few years, an increasing percentage of the merch ore shipped from the Lake Superior region, particularly from the Mesabi Range, has been beneficiated from sub-grade hematitic ore. It is reasonably expected that this trend will continue and that the Lake Superior ranges will be able to supply most of the ore requirement for blast furnaces in the lower lake region until such time as the processing of blast furnace ore from magnetic taconite is expanded to take up the deficiency occurring in the mining of hematitic type ores.

☑ Mr. Ramseyer

The idea that the low 1200-pound coke rates obtained by Swedish blast furnace operators on all sinter burdens were due to purely local conditions has been dispelled by remarkable results obtained in England, and more recently here, with similar 100 per cent sinter practice. Savings of

C. L. KINGSBURY
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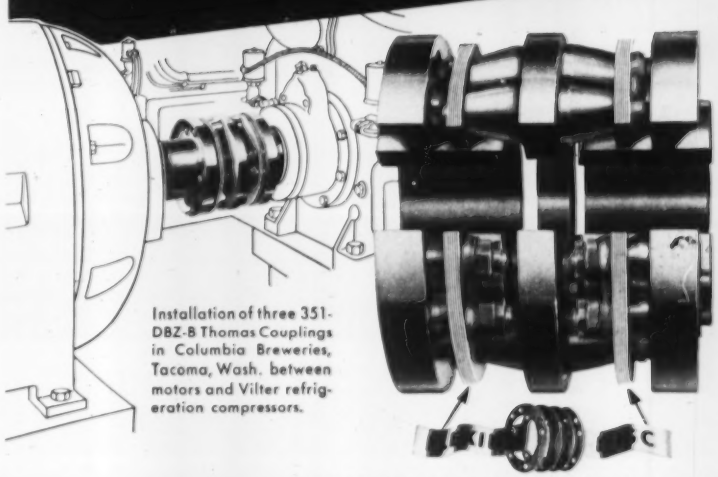

Installation of three 351-DBZ-B Thomas Couplings in Columbia Breweries, Tacoma, Wash. between motors and Vilter refrigeration compressors.

Patented Flexible Disc Rings of special steel transmit the power and provide for parallel and angular misalignment as well as free end float.

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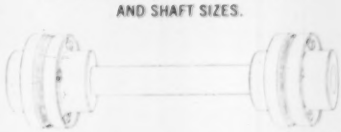
FACTS	EXPLANATION
NO MAINTENANCE	Requires No Attention. Visual Inspection While Operating.
NO LUBRICATION	No Wearing Parts. Freedom from Shut downs.
NO BACKLASH	No Loose Parts. All Parts Solidly Bolted.
CAN NOT "CREATE" THRUST	Free End Float under Load and Misalignment. No Rubbing Action to cause Axial Movement.
PERMANENT TORSIONAL CHARACTERISTICS	Drives Like a Solid Coupling. Elastic Constant Does Not Change. Original Balance is Maintained.

THOMAS COUPLINGS ARE MADE FOR A WIDE RANGE OF SPEEDS, HORSEPOWER AND SHAFT SIZES.



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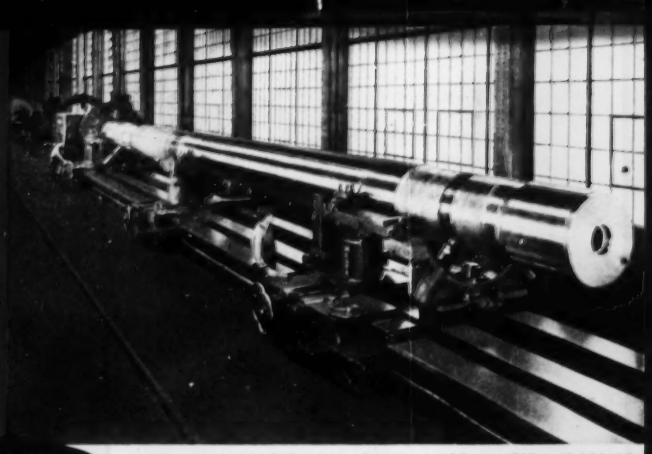
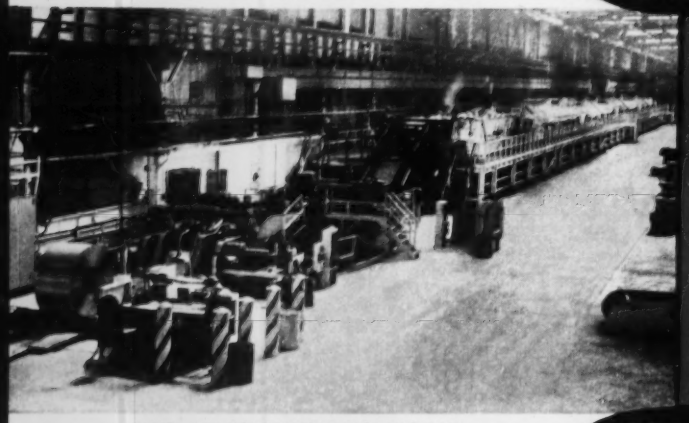
MESTA



MACHINING FORGED STEEL COLUMN FOR A MESTA 50,000 TON HYDRAULIC PRESS ON A MESTA 96" HEAVY DUTY LATHE



MESTA 60" CONTINUOUS PICKLING LINE WITH TRIMMER AND UP-COILER

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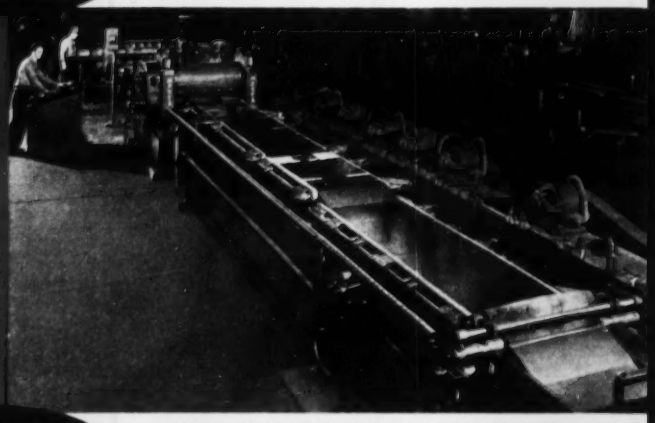
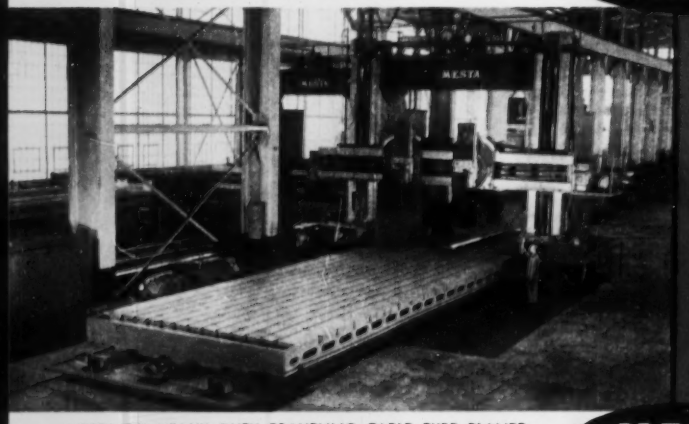


MESTA 42" TIN SHEARING LINE WITH TRIMMER AND COMBINATION FLYING SHEAR AND LEVELLER



MESTA 15' HEAVY DUTY TRAVELING TABLE TYPE PLANER

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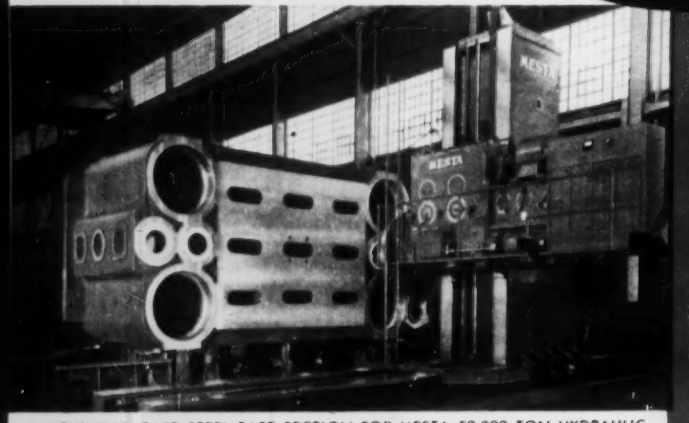
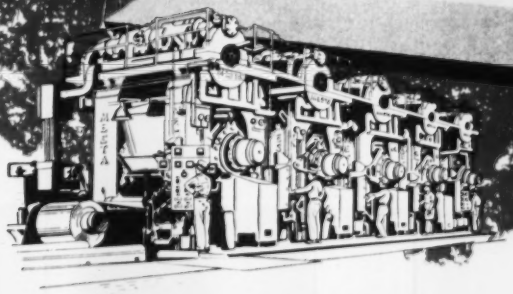
MESTA 46" TWO-HIGH REVERSING SLABBING-BLOOMING MILL WITH MANIPULATORS AND TABLES



MACHINING CAST STEEL BASE SECTION FOR MESTA 50,000 TON HYDRAULIC PRESS ON A MESTA 18" HORIZONTAL BORING AND MILLING MACHINE

MESTA 29" STRUCTURAL MILL WITH TRAVELING TILTING TABLE

Designed and Built by MESTA



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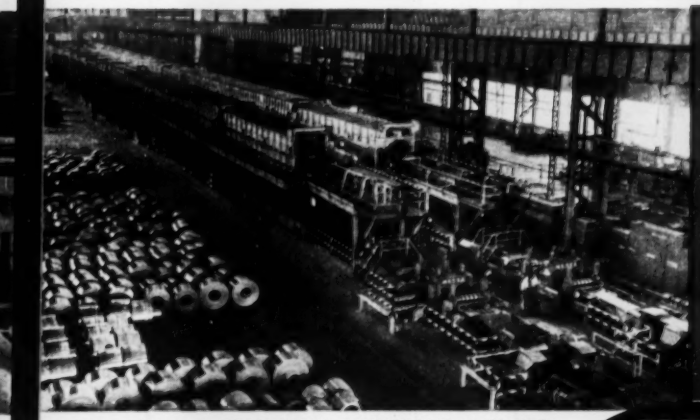

TWO MESTA 48" CONTINUOUS GALVANIZING LINES WITH FEED REELS, STRAIGHTENERS AND MASH WELDERS

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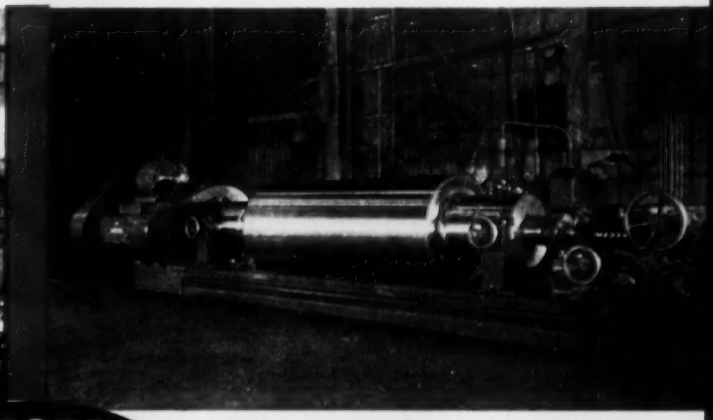
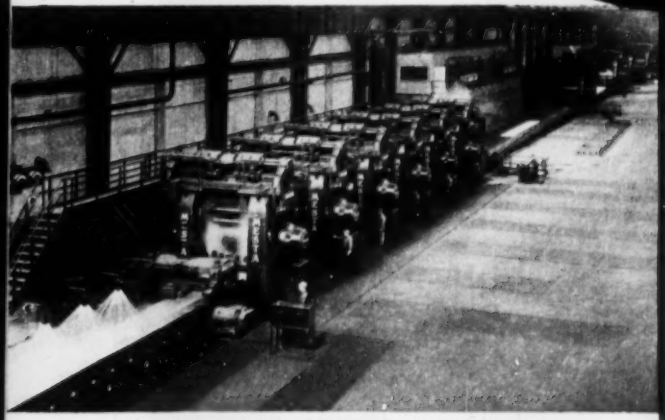
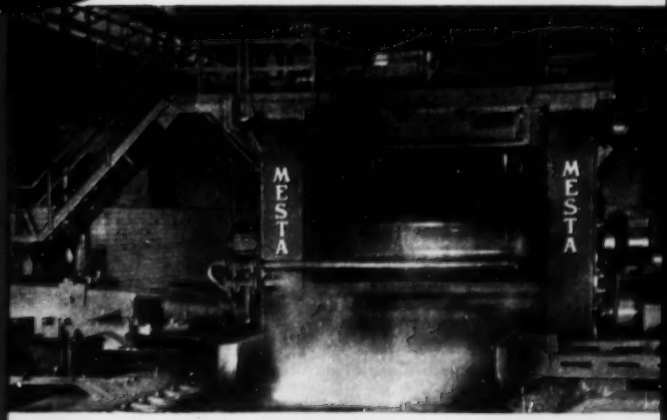


MESTA HEAVY DUTY TRAVELING WHEEL TYPE ROLL GRINDER FINISHING A LARGE MESTA BACKING-UP ROLL



MESTA 80" FOUR-HIGH CONTINUOUS HOT STRIP MILL



MESTA 160" FOUR-HIGH REVERSING PLATE MILL

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Only PITTSBURGH **Armored Gears** are made according to the exclusive PITTSBURGH formula which covers a proven combination of metal, machining, AND heat-treating. It is not enough to use tool steel, which often will not stand shock loads. PITTSBURGH selects the best metal for the particular gear body, then machines it, and heat-treats the wearing surfaces to give ultimate life.

This process gives you gears that have tough, ductile cores, and teeth that wear almost interminably. PITTSBURGH **Armored Gears** are guaranteed to give five times the life of untreated gears, one to one and one-half times the life of oil-treated gears, and equal or longer life than any other gear in identical service. You can identify them by their "**Pittsburgh Purple**" corrosion preventive coating.

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President, Cleveland Cliffs Iron Co.
Cleveland

300 to 500 pounds of coke per ton of pig and increases of 30 to 40 per cent in furnace output have been obtained. Whether this is enough to pay for new sintering plants and the cost of sintering, with the industry running below full capacity, is a moot question at the moment.

Interest continues high as to the ability of the electric furnace to compete with the open hearth—with a heavy preponderance of opinion favoring the open hearth for hot metal steelmaking practice. With two 24½-foot electrics tapping 175-ton heats going into production in 1954, the race between the two continues.

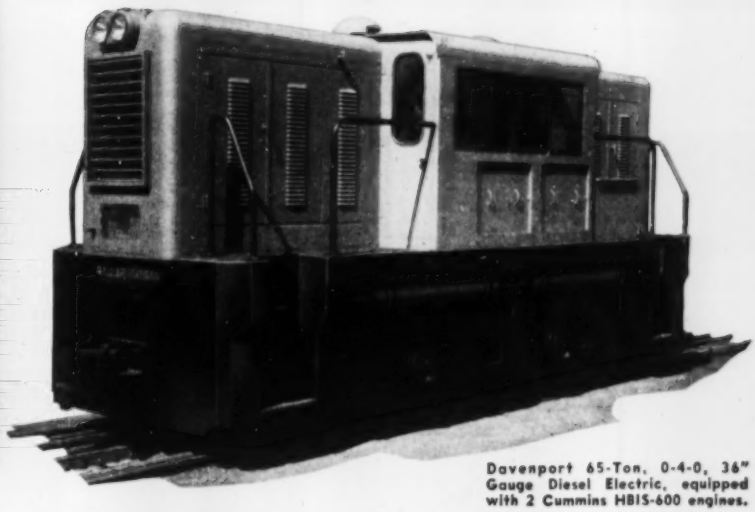
Two new top-blown pure oxygen bessemer plants will go into operation shortly in the Western Hemisphere—one in Canada and one in the United States. Based on work done largely in Austria, this new process gives every indication of being able to make a product fully equivalent to the best open hearth steel, at considerable savings in both capital and operating costs over the open hearth.

☑ Mr. Sterling

The threat of an iron ore shortage which was so prevalent one or two years ago has resulted in an expansion program which will easily insure an adequate supply for all normal needs, and will meet the increasing demand for steel except in critical times of a national emergency. Expansion of operations in intermediate ores which must be concentrated, and in underground direct shipping ores will help replace the dwindling direct shipping, open-pit supply. This will be further augmented by the expansive development in the so-called low-grade ores such as taconite and jasper.

This latter course, although costly,

We Build DAVENPORT LOCOMOTIVES SPECIAL to Meet STEEL MILL Operating Conditions



Davenport 65-Ton, 0-4-0, 36" Gauge Diesel Electric, equipped with 2 Cummins HBIS-600 engines.

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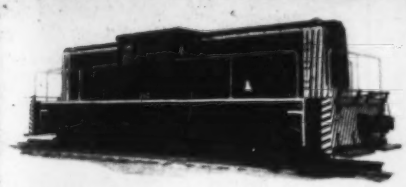
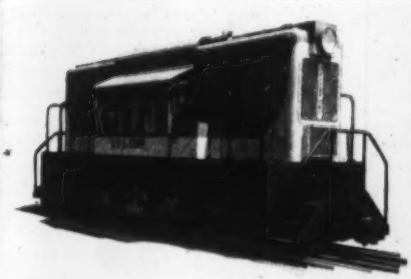


100 Ton, 0-4-0, Davenport Diesel Electric, 56½" Gauge, equipped with 2 Cummins HBS engines.

Davenport 25-Ton, 0-4-0, Diesel Electric, 56½" Gauge, built for low clearance, equipped with GE 6055 engine.



50-Ton, 0-4-0, Davenport Diesel Electric, 36" Gauge, equipped with 2 Hercules DFXD engines.

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STEAM
STEAM STORAGE
DIESEL *with* **TORQUE CONVERTER** *or* **ELECTRIC** *or* **MECHANICAL DRIVE**

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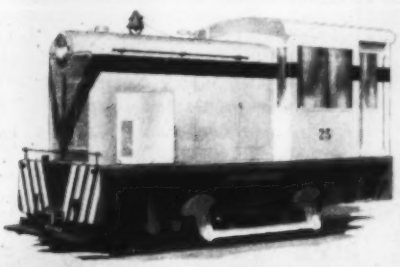
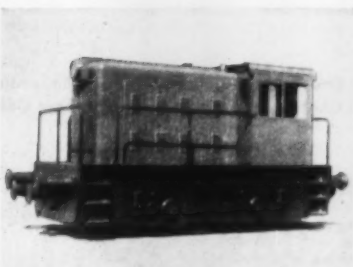


25-Ton, 0-4-0, 30" Gauge Davenport Diesel Mechanical, equipped with Caterpillar D-17,000 engine.



35-Ton, 0-4-0, 56½" Gauge, Davenport Diesel Electric, equipped with Cummins HBS engine.

Davenport Diesel Mechanical, 12-Ton, 0-4-0, 48" Gauge, equipped with Caterpillar D-318 engine.

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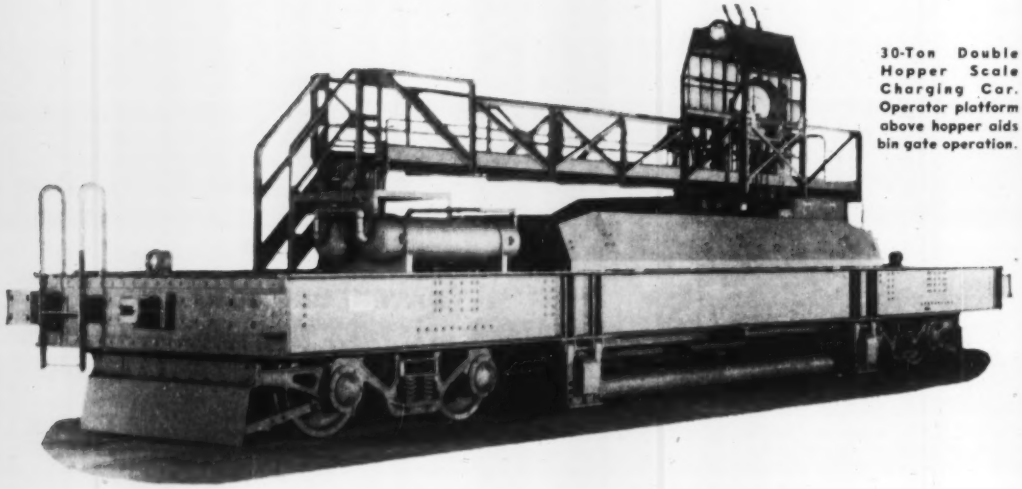
120-Ton Side Dump Ore Transfer

More than a half century's experience in producing steel plant cars gives Atlas a fund of engineering knowledge in this highly specialized field. Its value to you is reflected by the ability of Atlas to develop cars that fill the bill for performance, safety, and dependability.



30-Ton Double Hopper Scale Charging Car. Operator platform above hopper aids bin gate operation.

Builders of Scale Charging Cars and Ore Transfers; Indicating and Recording Dials for Weighing Scales; Electric and Storage Battery Locomotives; Coal Charging Cars; Door Extractors; Coke Quenching Cars, and allied equipment

THE ATLAS CAR & MFG. CO.

1140 IVANHOE RD. CLEVELAND 10, OHIO, U.S.A.

A. C. DYER
Vice President—Sales
Electric Controller & Mfg. Co., Cleveland

is very necessary for national security even though a large part of the replacement tonnage of the direct shipping ores could be met by the imports from the large projects under development and expansion in Ontario and Labrador in Canada and in Venezuela, Chile, Peru and Liberia. Additional known deposits in Canada, South America, Mexico and Africa can be developed when necessary to meet the natural growth in the demand for steel.

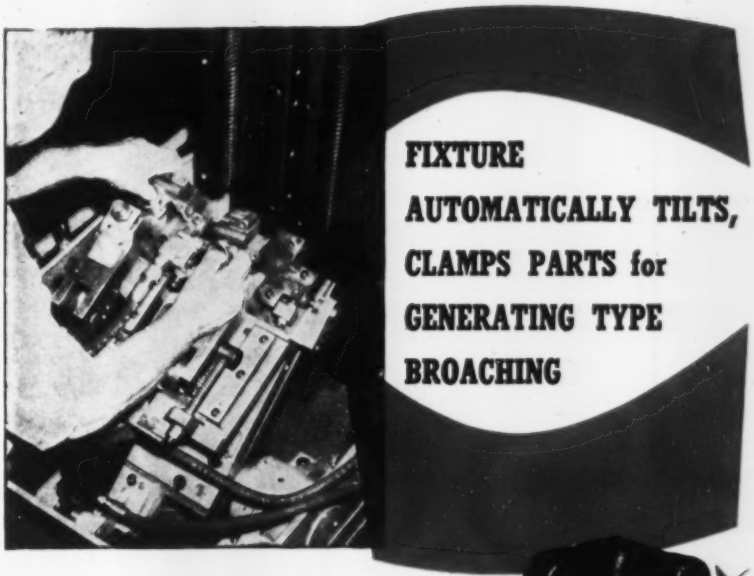
We should likewise give serious thought to conserving in a sound and practical manner some of the few remaining reserves of high-grade, direct shipping, open pit ore in the Great Lakes area.

Mr. Dyer

Automatic presetting of the screwdown on plate and roughing mills has been used with success for several years, but has not been generally applied to blooming or slabbing mills. Increased use in its application to blooming mills is expected to prove very beneficial. By the use of electronics, balance detectors and anticipators, much higher screw speeds can now be had with the same positioning accuracy.

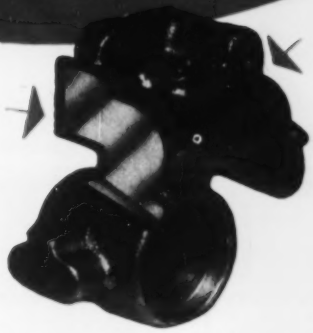
Improvements have been made in the schedule panels to make them much more compact. By relieving the mill operator of the necessity of thinking of the draft schedule, he can concentrate on the other two operations, resulting in better efficiency and an increase in mill production.

The greater tonnages produced by the larger open hearth and electric furnaces has made larger lifting magnets necessary for loading the charging boxes. The world's largest lifting magnets—80 inches in diameter—are now operating in this service. This magnet is capable of lifting over 4½ tons of pig iron or 1½ tons of light grade scrap.



FIXTURE AUTOMATICALLY TILTS, CLAMPS PARTS for GENERATING TYPE BROACHING

Speeds production of parking brake brackets designed and built the American *way*



Two parallel surfaces on each of two parts are straddle broached in one pass on this American SB-42-10 single ram broaching machine. Over 350 of these intricate parking brake brackets are completed every hour.

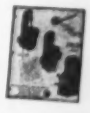
The complete tooling designed the American Way features:

1. **Generating type broaches.**
2. **Fully automatic work holding fixture with tilting table.**
3. **Automatic clamping and unclamping of parts.**

The operator simply loads and unloads the parts, starting each machine cycle by push button control.

For the answer to your broaching problem send a part-print or sample and hourly requirements to American . . . the organization that gives you the extra advantages of experience in producing all three . . . broaches, machines and fixtures. No obligation. Address Dept. S.

For more information on the American SB-42-10 and other American machines, write for Circular #300.



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A DIVISION OF SUNDSTRAND MACHINE TOOL CO.
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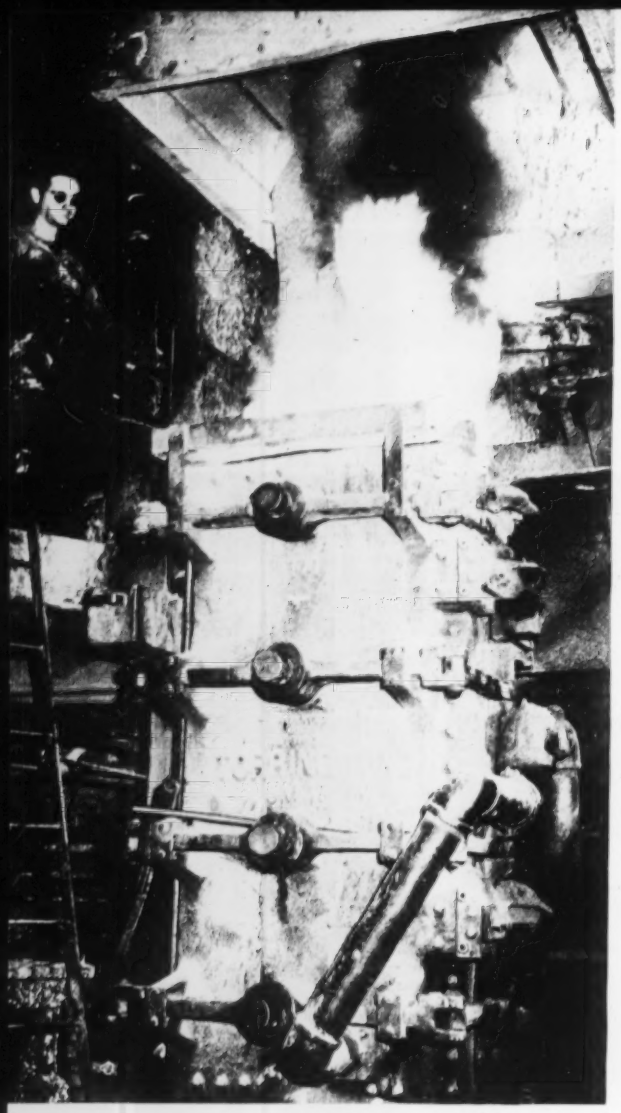
SUNDSTRAND



TECHNICAL PROGRESS

Nonferrous Metals

FINDING growth opportunities across the entire spectrum of metalworking, nonferrous metals show dramatic progress both in development of new metals and in new and better combinations of older metals.

Eleven copper mining projects are being developed at a cost of $300 million to treat some 1.2 billion tons of sulfide and oxide ores. Suspension and flash roasting, raw concentrate smelting and leach precipitation float operations create most interest. Use of larger copper cakes or continuous casting units in conjunction with mills rolling up to 1000 fpm allows production of wider and longer coils of copper and brass. Coming to the fore are triple drawbench and block drawing methods to speed tube drawing.

Zinc smelting operations receiving most attention are roasting, charge preparation, condensation, melting and casting. In lead plants, trend is toward larger and fewer units, featuring improved feed preparation, rapid sintering and vacuum dezincing.

In the light metals, aluminum and titanium output surged strongly but magnesium eased back from last year's production peak. Highlights in aluminum are new high-strength alloys, use of protective atmospheres for annealing, and rapid expansion of fabricating facilities. Titanium output, despite production problems plaguing the industry, shows great progress in a year but demand will not be overtaken for some time.

☑ Mr. Zeigler

A new level of aluminum ingot quality already realized in pilot scale operations has yielded wrought products in high strength alloys with improved resistance to fatigue and stress cracking. The improved manufacturing processes and techniques responsible can be expected to enhance quality and general performance of a major portion of all aluminum alloy products as fast as new equipment required can be incorporated into current production.

Recent improvements in soldering of aluminum wire, new techniques for metallurgically joining dissimilar metals and advanced mechanical connector designs all portend significant expansion of the use and production of aluminum conductors. Progress in manufacturing techniques is particularly significant in the development of aluminum cable sheathing where the strength of aluminum offers many functional advantages. Continued technological progress combined with potential engineering and economic advantages must eventually convert a major proportion of cable sheathing to aluminum.

Production of hot and cold rolled plate and heavy sheet for use in welded assemblies should be encouraged in 1954 by recent and continuing research and development on high strength, weldable alloys.

☑ Mr. Vogel

Production of primary magnesium in 1953 was approximately 106,000 tons. Stretch-outs in military aircraft production resulted in some decrease in the tonnage of magnesium used by the Armed Forces, despite the fact that several important new military uses were initiated in 1953. On September 30 Army Ordnance announced a new development program designed to result in lighter, more compact equipment. This will result in greatly increased military use of all light metals.

There has been a definite trend, particularly in the last two quarters of 1953, toward expanded use of magnesium for commercial and industrial applications. Primary magnesium price was increased March 9, 1953 from 24.5 cents per pound f.o.b. shipping point to 27 cents. This caused a slight increase in price of magnesium products. However, late in 1953 the prices of magnesium raised-pattern tread plate of 48-inches width and less decreased 3.5 cents per pound. Quantity prices on 60-inches wide large size tread plate decreased still more.

Dow's new high-capacity coil mill at Madison, Ill., started to roll magnesium sheet late in 1953. This mill, together with Alcoa's mill at New Kensington, Pa., and Brooks & Perkins' mill at Livonia, Mich., can supply sufficient sheet and plate to support not only military use, but tremendous expansion in civilian uses.

☑ Mr. Zimmerley

The year 1953 was one of transition for copper mining projects planned several years ago and now reaching various stages of completion. Eleven projects in progress within the United States involve a total investment of $300 million to treat an estimated reserve of 1.2 billion tons of sulfide and oxide copper ores. At least $400 million will be required to complete eleven foreign projects to treat approximately one billion tons of reserves.

Fluo-Solids or suspension roasting of sulfide concentrates continues to be of interest for sulfate roasting of copper concentrates. The soluble copper so produced is leached and the solution electrolyzed for recovery of copper. Variants of this procedure would substitute for conventional roasting, smelting, and refining.

Autogenous smelting of copper sulfide concentrates at Outokumpo Oy (Harjavalta, Finland) by the combination of a flash roaster and matte smelting furnace has been improved by perfecting the heat exchanger, which preheats the incoming air to 500° C. The flash roaster is superimposed over the reverberatory furnace in which the smelting reactions are completed. Another variation of autogenous smelting is being practiced at Copper Cliff, Ontario where oxygen is used in the flash smelting stage of the process.

☑ Mr. Kennedy

Copper rolling mill practice is moving rapidly toward use of larger cake, finishing of longer coils, and rolling of wider widths. Practice at the moment seems to be to use 4-high mills running up to 1000 fpm or faster, and rolling up to a width of about 25 to 36 inches down to as light as 0.002-inch gage.

These mills are equipped with electronic gages and may be either reversing or straight-through mills. Generally speaking, maximum cake weight available at the moment is 2000 pounds, but this is quite likely to increase in size as time goes on. The rolling mills, in fact, are ahead of their customers in that most customers are not equipped at present to handle the longer coils which the

PAUL P. ZEIGLER
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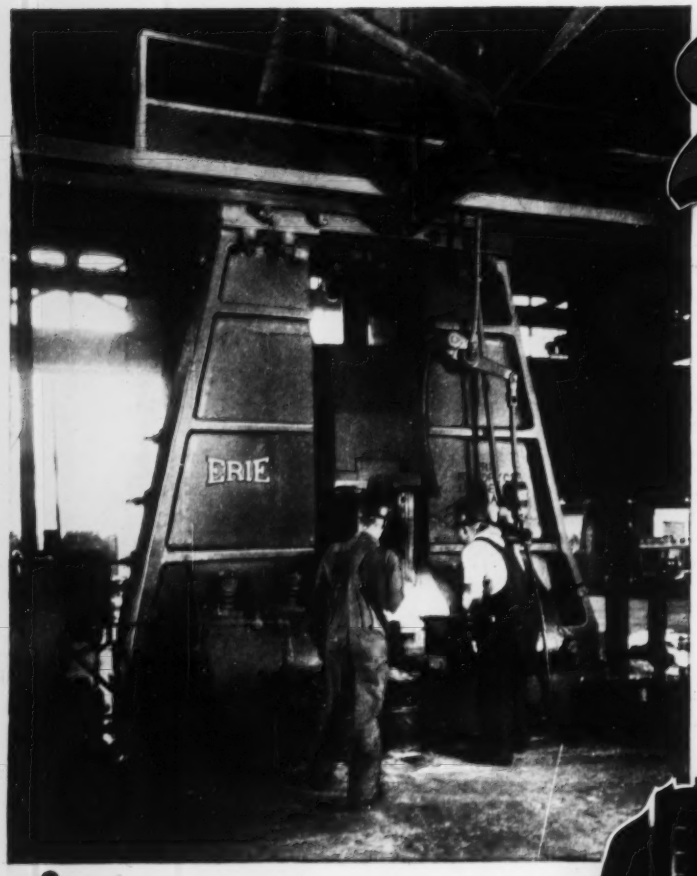
Research Director, Western Mining, Kennecott Copper Corp., Salt Lake City

J. M. KENNEDY
Chairman, Revere Copper and Brass Co., New York



21 ERIE

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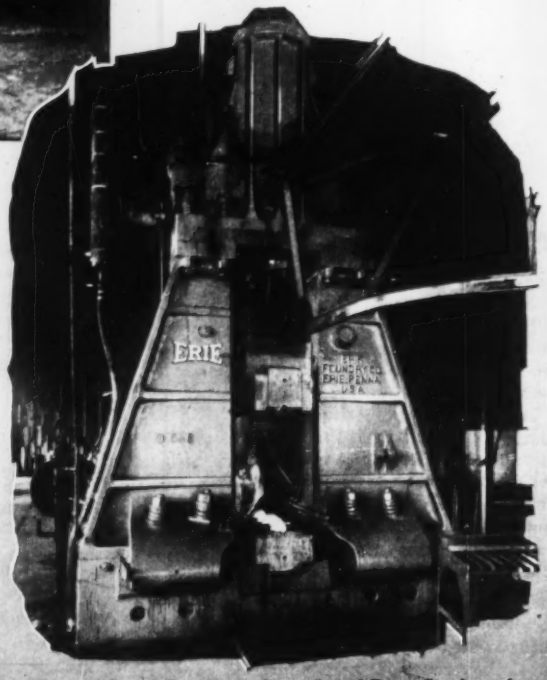

9 – 15,000 lb.

2 – 12,000 lb.

10 – 5,000 lb.

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Lead Industries Association New York

ROYDON S. PRATT
Technical Director, Bridgeport Brass Co. Bridgeport, Conn.

W. T. ISBELL
Division Mgr. St. Joseph Lead Co. Herculanium, Mo.

rolling mills are prepared to supply.

Running parallel and in competition with the triple drawbench in production of smaller sizes of copper tube is the block drawing method using a floating block. By this method it is possible to draw tube at speeds in excess of 1000 ft per minute and in lengths of 1000 ft or more. However, only one tube at a time can be drawn this way.

Mr. Gent

No one can successfully contend that zinc at present levels is pricing itself out of the market.

For the better part of the year, use of zinc in galvanizing and in die casting has promised to break all previous records. It is still possible that when the complete record is available, consumption in 1953 will prove to have exceeded previous high points.

Rolled zinc has experienced a revival of interest. Its qualities are again coming to the notice of architects and builders, and designers and engineers are weighing the economies and virtues of the metal in various applications.

Now that the theory and practice of cathodic protection is better and more widely understood, zinc as a galvanic anode is taking a prominent place in this expanding use. For marine exposures, ships and submerged steel structures; for pipelines, tanks and utility lines underground and industrial plants, substantial savings are promised in materials and maintenance costs by resorting to zinc anodes for corrosion protection.

Mr. Ziegfeld

Most new developments involving the use of lead are in chemical construction, although lead's high density is being used to an ever increasing extent in the form of bricks, sheet and castings for protection against radiation from radio-isotopes, gamma rays and x-rays.

There is a distinct trend in the plumbing industry to machine wipe and prefabricate lead plumbing in the shop, which materially reduces costs and makes lead plumbing competitive with other materials.

Latest development in the lead alloy field is in the battery grid alloys to improve characteristics of lead-acid batteries to meet the auto industries' need for higher capacity and longer lasting batteries without increasing size. Several new alloys on the market involve addition of small percentages of copper and silver and occasionally tellurium, along with other elements to replace some of the antimony.

There have been significant developments in the use of lead chemicals. Porcelain enamel coatings on aluminum have great possibilities. The low melting which the high lead content contributes to enamel frits is essential since porcelain enamel coatings on aluminum must be applied at much lower temperatures than on steel. Use of lead stabilizers in vinyl plastics is now reaching sizable proportions tonnage-wise also.

Mr. Pratt

Increased use of copper and copper alloy scrap has been necessitated partly to conserve primary copper and partly because of economic reasons. These tendencies have been helped by development of the direct reading spectrograph which permits much more rapid analysis of the melts in the casting shop by eliminating photographic methods previously required. This development started in the aluminum industry, and within the last two years spectrographic equipment has been installed by several of the large copper alloy producers.

Much attention has been given to special processing techniques to improve yield of satisfactory products and minimize amount of process scrap. There has been considerable interest in the Sejournet process for extrusion of steel using a lubricant of liquefied glass. The copper alloy industry also has become interested in this process, and it appears that there are definite advantages in terms of increased production and decreased scrap.

There is increased interest throughout the copper alloy industry in fabrication of aluminum. Several of the larger producers already are processing aluminum in various forms. Development of a high frequency electrical welding machine for roll forming and welding will have a far-reaching influence on the production of nonferrous tubes.

Mr. Isbell

New lead plant designs tend toward the use of larger and fewer units with emphasis on hygienic conditions within the plant and increased use of mechanized material handling. Metallurgy, the process of sintering followed by blast furnace smelting continues, though there have been improvements within these general lines.

Up-draft sintering has received considerable attention since its development by Broken Hill Associated Smelters at Port Pirie, Australia. This method of sintering seems to give higher sulphur dioxide contents of exit gas and better control of windbox lead. It may well find wider use as lead sintering plant gases receive more attention as a source of SO_2 for sulphuric acid manufacture.

Lead blast furnaces continue much as always but plants in areas of cheap electrical power will probably consider more and more the use of electric smelting units. In refining, a notable new development is the use of semi-continuous vacuum dezincing

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Laurel Hill, N. Y.

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Institute, Inc., Columbus, O.

D. K. CRAMPTON
Research Director, Chase Brass &
Copper Co., Waterbury, Conn.

FRANK H. VANDENBURGH
Vice President, Mallory-Sharon
Titanium Corp., Niles, O.

at Port Pirie. More and more plants which use the Parkes process for desilverizing are swinging to the use of vacuum dezincing for zinc recovery.

Mr. Osborn

Geophysical prospecting in the field of copper has been expanded. Diesel electric engines have largely replaced steam or electric haulage units in open pit mines. Improvements in flotation, grinding methods, etc., for concentration of sulphide ores rather than development of radically new processes have been the rule. For mixed sulphide-oxide ores much work has been done on leach precipitation float (LPF) and leach precipitation methods. The Greater Butte project LPF plant in Montana and the leach precipitation plant at Yerington, Nev., are examples.

Raw concentrate smelting has largely replaced the older practice of calcining followed by reverberatory smelting. Neither the Morenci nor the new Ajo smelter of Phelps Dodge use roasters.

Except for improvements in electrolyte purification and biproduct recovering of nickel salts, few changes have been made in electrolytic refining practice.

Fabrication has seen increase in continuous casting both of alloys and pure copper shapes. In cupro-nickel alloys efforts toward reducing nickel content and substitution of iron for part of the nickel have been continued. For cable insulation natural rubber has been largely replaced by synthetic compositions.

Mr. Nekervis

Tin supply, so far as U. S. consumers are concerned, is excellent. Reserves are more than adequate. There is no shortage of tin in the ground or present capacity to produce it in any of the four principal producing areas. The Malay Peninsula (including the Indonesian Islands, Sinkep, Banka, and Billiton) account for 60 per cent of output, Bolivia 20 per cent, Belgian Congo 8 per cent and Nigeria 5 per cent.

Price of tin is now about where it was before the outbreak of hostilities in Korea. U. S. strategic stocks of tin are in such good shape that further purchases will be suspended after next March, not counting the outstanding commitments.

From the producer's standpoint, the outlook is not so good. The price is below production costs of a large portion of the industry. Bolivia's Minister of Mines reported in September that Bolivia was producing tin at a deficit of 19 cents per pound. A large number of gravel pump mines in Malaya have been shut down. Although reserves are adequate, the richer ores are exhausted and it is necessary to draw more and more upon deposits of lower grade.

Mr. Crampton

In casting of brasses there is increased use of larger induction furnaces with much higher input. The trend is definitely toward multiple channel units. Sheet and strip production shows a steady increase in unit weights handled, many mills going as high as 3000 pounds per bar without welding and 6000 pounds with heliarc welding. Along with the larger units there is an increase in speeds of rolling, in some instances as high as 1000 fpm.

Tube production features multiple drawbenches for straight lengths. In addition, some copper tube is being produced in very long coils by a series of draws on large diameter blocks and with very high total reductions. This results not only in greater production but in very long lengths of small sizes not feasible with bench drawing operations.

Rod mills are also an increasing use of multiple drawbenches as well as machines combining the functions of drawing, straightening, cutting-off and polishing. Annealing furnaces have been much improved with respect to atmosphere control and temperature control. These result in improved uniformity of temper and of surface condition.

Mr. Vandenburgh

Outlook for titanium is rapid progress—both in technology and production. The new Mallory-Sharon melting process, Method "S", has proved to yield ingots superior to anything previously known. The ingots are highly homogeneous. Carbon content can be controlled exactly and held as low as the amount inherent in the sponge raw material. Sheet produced by Method "S" is homogeneous and easy to machine and weld.

The production picture also shows

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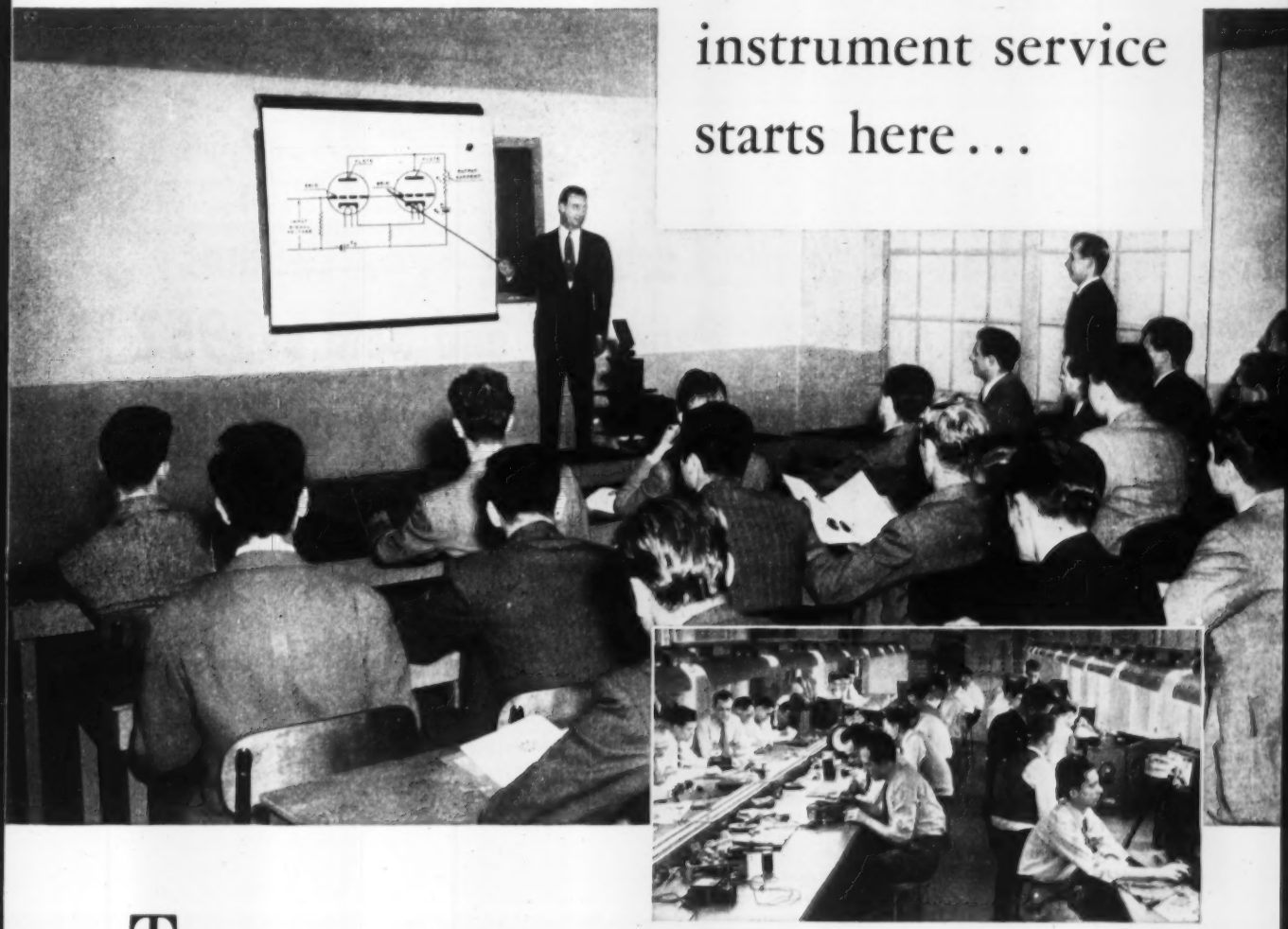

THOROUGH TRAINING is the foundation of Honeywell instrument service. In classrooms and in the Honeywell factories, hand-picked men first are schooled in both the theory and practical art of keeping good instruments in the best condition.

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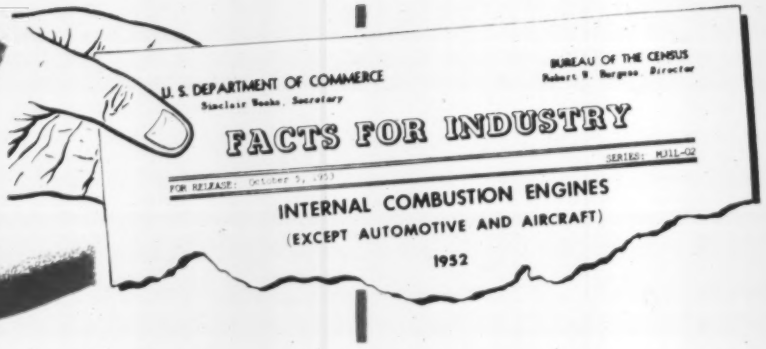


More than 50% of * Carburetor Type Engines from 3 to 40 H.P., Produced and Sold in 1952 for Re-Sale or Original Equipment Power *were*

WISCONSIN ENGINES

* *Does not include automotive, aircraft, outboard marine or "captive" engines made by manufacturers for use on their own equipment.*

Again official U. S. Government statistics provide positive proof of Wisconsin Air-Cooled Engine leadership, based on figures contained in Bureau of The Census release, dated Oct. 5, 1953.

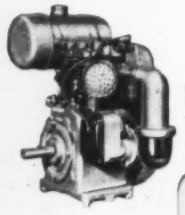
These statistics, compiled from reports received by the Census Bureau from 94 manufacturers of Internal Combustion Engines, indicate that Wisconsin Motor Corporation produced more engines within our horsepower range, *than all other engine manufacturers combined.* This includes all Census Bureau classifications from 11 to 175 cu. inch piston displacement, although the smallest Wisconsin Air-Cooled Engine has a displacement of 13.5 cu. inches, and the largest 154 cu. inches.

The breakdown, based on Census Bureau groupings is as follows:

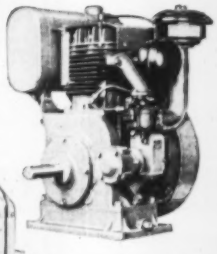
11 to 50 cu. in. displ., Wisconsin's share	**54.22%**
51 to 100 cu. in. displ., Wisconsin's share	**72.51%**
101 to 175 cu. in. displ., Wisconsin's share	**29.44%**

The aggregate average of Wisconsin Heavy-Duty Air-Cooled Engines, within the above power classifications, amounts to more than 50% of the total . . . in excess of the combined output of the other 93 engine manufacturers covered by the survey.

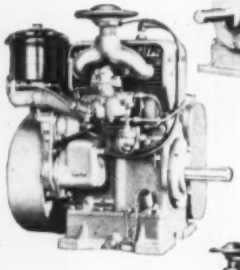
This Proof of Preference should be of special interest to all original equipment purchasers, users, distributors and dealers because it is indicative of outstanding Customer Satisfaction . . . based on Wisconsin Engine Structural and Operating Power Advantages. It pays to back a winner!



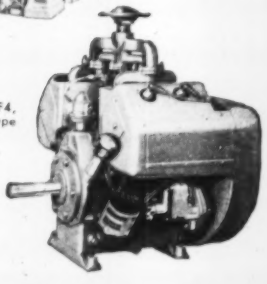
Models ABN, AKN, AEN, 4-cycle single cylinder, 3 to 8¼ hp.



Models AFH, AGH, AHH, single cylinder, 6 to 9 hp.



Models TE and TF, 2-cylinder, 7 to 15 hp.



Models VE4, VF4, and VG4D, V-type 4-cylinder, 15 to 36 hp.

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progress, and we plan a sizable expansion program during 1954. Total industry production will probably lag behind demand for a long time to come. Although virtually all output is controlled by government priority, we expect our number of customers to double in 1954, as more subcontractors come into the picture.

Mr. Ogden

Continuous casting has given copper and copper alloy producers a method whereby complete control of their product is possible from start to finish. Users have found that they can obtain uniformity of product, both interiorwise and surfacewise. Periodic sampling of the casting, with subsequent checks for surface condition, chemical analysis, internal structure, and physical properties, rarely shows any measurable changes in character or composition of the metal produced. If any deviation from standard is noted immediate corrective measures can be taken without interrupting the casting progress.

Many sizes and lengths of extrusion and rolling billets can be produced with little change in the casting equipment. Trend today by rolling mill operators is to produce heavier coil weights. Here, continuous casting has a great advantage as it is possible to cut the cast bar to any length to obtain the final coil weight desired.

Economically, continuous casting has great advantage as it produces a product of uniform analysis, with reduced scrap losses and with minimum labor.

Mr. Pearce

Parallel-sided copper cakes or slabs weighing from 1800 to 3000 pounds are now being produced from two oil-fired furnaces at the Perth Amboy plant at a rate of several hundred thousand pounds per day. Twelve molds on the casting wheel allow removing one copper cake from the wheel while another is poured, at a rate of one cake every two minutes.

Maximum size copper cake previously produced by the company was a wedge cake weighing 840 pounds. Production of the new, parallel-sided cake (dimensions: 65 to 76 inches long, 5 inches thick, and from 15½ to 24⅜ inches wide) makes it possible to roll longer coils of sheet now in demand by industry. These longer coils enable fabricators to run their machines with a minimum of set-up time, fewer changes and more economical operations. The project at this Anaconda subsidiary began on May 1, 1951, and was completed July 20, 1953.

Mr. Davison

A new high in consumption of zinc for die casting was reached in 1953. Something on the order of 300,000 tons of zinc was converted into die castings during the 12-month period. Previous peak was 282,000 tons in 1951.

This increase was not due entirely to high production rates for automobiles, household appliances and other products normally using zinc die cast components. It was also the result of a desire on the part of designers to make their products more salable—with lower price tags—by taking greater advantage of cost-saving qualities of zinc die castings.

With ample die casting capacity available, and with assurance that zinc supplies are sufficient to meet both short and long-range requirements, product engineers are turning more and more to zinc die castings to meet keener competition for the consumer's dollar. This trend bodes well for the die casting industry for 1954.

Mr. Freeman

Development of Formbrite polishing brass was furthered considerably in 1953. Through installation of new equipment in many mills and application of rigid manufacturing controls we have been able to produce practically the entire group of brasses in an ultra-fine grain and in a range of tempers that will make it practical for a wide variety of commercial applications, particularly where high finish or plating requirements are common.

Plans call for extension of this research and development to other groups of alloys. We have good reason to believe that we will be able to improve certain important physical characteristics of many of our current standard alloys.

Mr. Haight

Expansion and improvement of facilities for fabricating aluminum mill products highlight Aluminum Co. of America activities during 1953. These developments should help meet growing demand for such products as extrusions, plate, sheet, foil, wire, pipe and tube.

Foremost among these developments has been installation of the 14,000-ton extrusion press at Lafayette, Ind., in connection with the Air Force Heavy Press program. This unit will go into operation early in 1954.

D. S. OGDEN
Assistant Sales Manager
Continuous Metalcast Co., Inc., New York

CALVIN D. PEARCE
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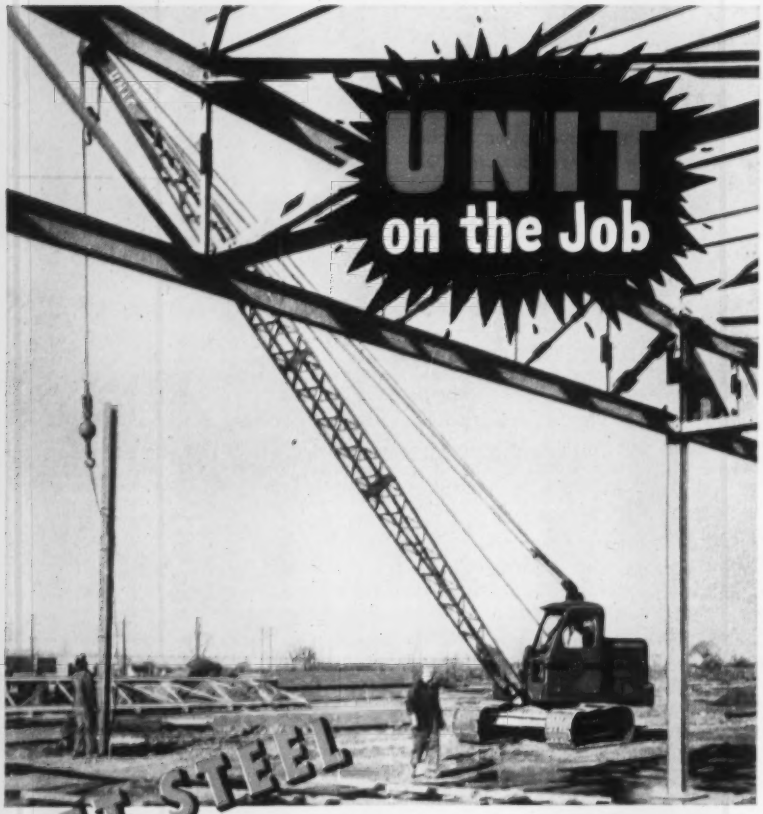
General Manager, Fabricating
Aluminum Co. of America, Pittsburgh



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CARLETON C. LONG
Director, Plant Research, St. Joseph Lead Co., Monaca, Pa.

A big 1500-ton capacity stretcher has already been installed to straighten extrusions from the press.

Another development is installation of a 144-inch rolling mill for production of roll-tapered sheet and plate for wing surfaces on high-speed aircraft. It will go into operation sometime in mid-1954 at Davenport, Iowa. Two mills for production of welded aluminum tube will go into operation at Alcoa, Tenn., during 1954.

In 1954 the new Lancaster, Pa., works will get into production of screw machine parts, rivets and fasteners. It was in partial operation during the latter part of 1953.

Mr. Long

North American zinc smelters have, over the past few years, given serious consideration to plant modernization; each year more of these plans are implemented by actual capital expenditures. Although it has been said that today no one can afford to build a new zinc smelter, expense of upgrading existing plants can often be justified economically.

Operations currently receiving major attention are roasting, charge preparation, condensation, melting, and casting. A 22-foot diameter, 150-ton-a-day fluidized bed roaster has been on-stream for over a year. Two other smelters are completing construction of Trail-type suspension roasters, together with contact sulphuric acid units. In Europe there seems to be a resurgence of interest in multiple hearth furnaces. It remains to be seen whether this interest will spread to North America.

Large sinter machines and autogenous briquette cokers are improving preparation of reduction furnace charge. Vertical retort operators have now standardized on the splash-type condenser. The electrothermic process has passed the 45 tons of zinc per

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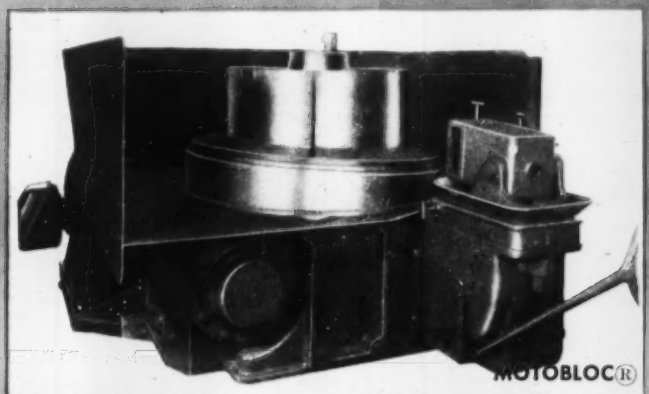

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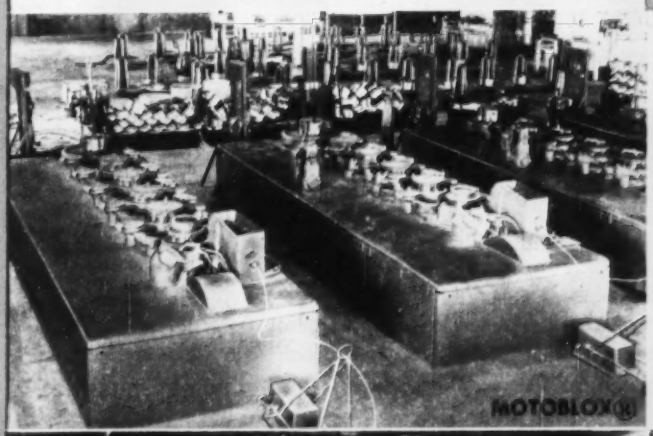

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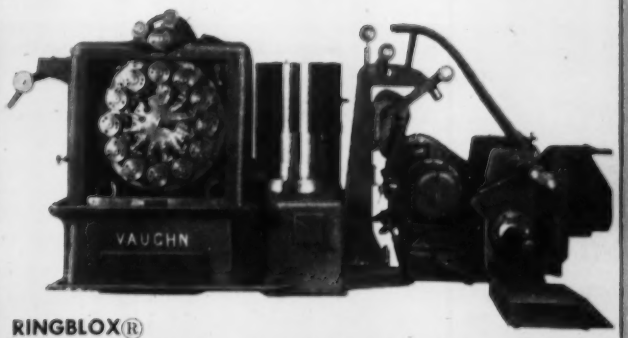

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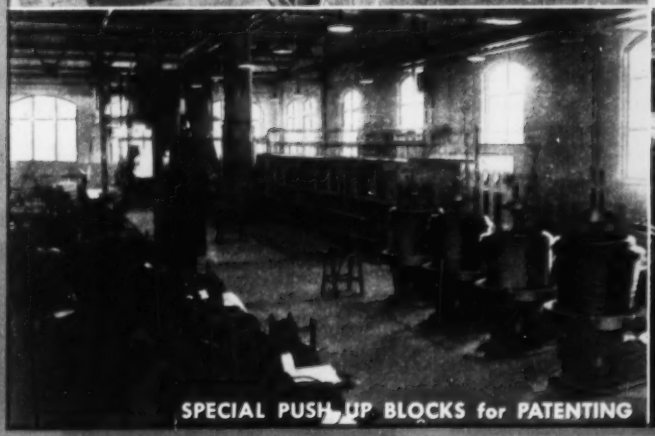

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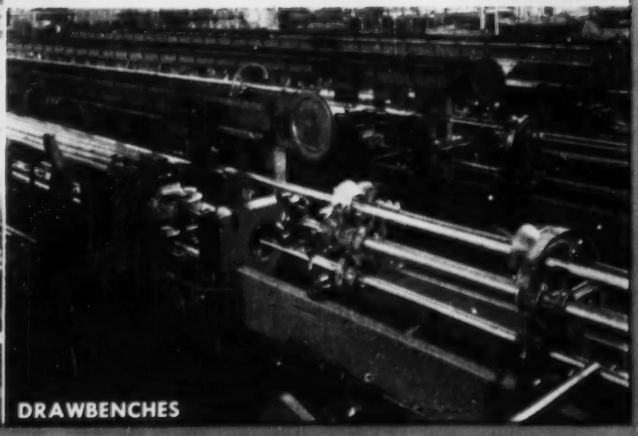

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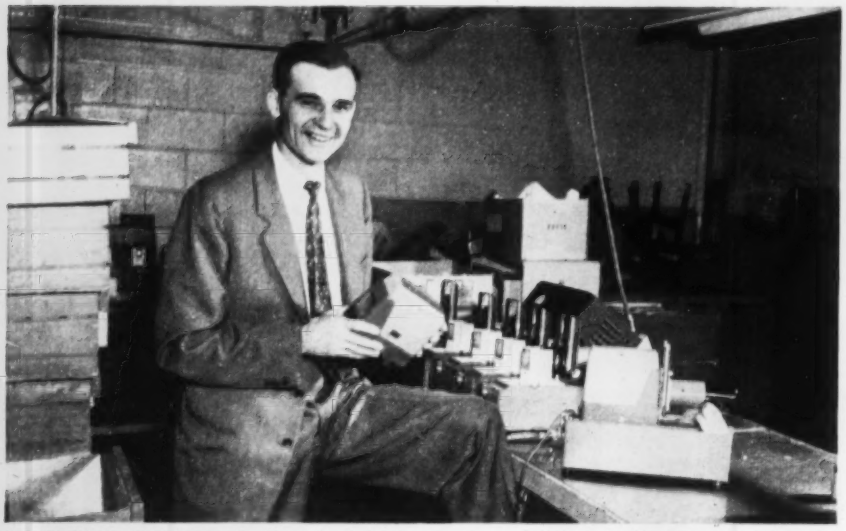
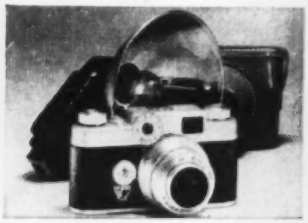


20% DROP IN REJECT RATE—*Small wonder Ralph Parsons, Foreman of the Paint Shop at Argus Cameras, Inc., is pleased as he examines the lamp housing from one of the new "300" projectors. The rich, wrinkle finish is applied with DeVilbiss spray equipment.*

48% SAVINGS IN SPRAYING TIME—*Lacquer spraying time was cut in half by using an automatic spray setup.*



20% SAVINGS IN SPRAY MATERIAL—*Correct air and fluid pressures give this Argus C-Four its handsome finish.*

DeVilbiss helps Argus save $1,660 a year in painting single camera part

Argus Cameras works with DeVilbiss Production Service to increase production, reduce rejects, save time and material

Argus Cameras, Inc., Ann Arbor, Michigan, is well known as one of America's leading manufacturers of fine camera equipment. Recently, starting production on their new "300" projector, they found unit labor costs and rejects were running too high in the paint shop.

Argus called in DeVilbiss Production Service. An on-the-job analysis of the entire Argus painting operation was made and specific recommendations for improvement were given. The results were eye opening:

A savings of $1,660 a year on direct labor cost for painting a single camera part. A savings of 48% in actual spraying time on another part. A savings of up to 20% in spray material for individual parts. A drop in rejects of 20% on the projector lamp housing.

There were other benefits, too. Workers respected the DeVilbiss expert. He held training classes and showed ways to improve their spray painting technique. And six months later, *their efficiency was still on the rise!*

DeVilbiss helps you get the *most* from the spray method. If you have a spray-painting problem, DeVilbiss will help you solve it. Service doesn't stop – it just *begins* when you order DeVilbiss equipment. For full information, contact your nearest DeVilbiss jobber, branch office, or factory.

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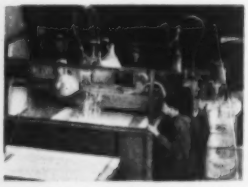
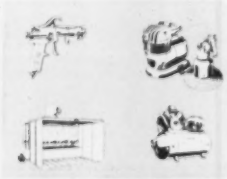
Spraying saves one-fourth the time . . . up to 50% in overall painting costs. On many surfaces, like acoustical tile, it is the only practical method.



Automatic spraying is cutting costs for many manufacturers. DeVilbiss has a wide variety of standard automatic spraying machines to serve you.



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Mills Works Manager, Scovill Mfg. Co.
Waterbury, Conn.

J. LOUIS REYNOLDS
President, Reynolds Metals Co.
Louisville, Ky.

W. J. RAVE
Magnesium Production Manager
Dow Chemical Co., Freeport, Tex.

furnace day average, and the 50-ton furnace is now in sight. A 300-ton-a-day cathode sheet induction melter is now operating and supplies an ingot casting machine.

Mr. Hoben

The brass industry now finds itself with plenty of copper and scrap but with a slight holding up of orders by customers from the high point in the spring. We in the industry feel that our customers are re-adjusting inventories with an eye on Chile re-entering the world's copper markets and that copper, a major ingredient of brass, will drop in price. If this happens, we will be going full blast again.

In the case of brass strip pressure continues on the mill to furnish larger coils. Our strip mill, built in 1949, features a 2000 pound coil. In the first quarter of 1954 we hope to have equipment changes made to standardize on a 3000 pound coil. About the same time we expect to complete our aluminum program to give us even better facilities for re-rolling aluminum strip.

Mr. Reynolds

A major technological advance in the aluminum industry is use of protective atmospheres in annealing aluminum sheet, foils and parts; protective atmospheres for annealing ferrous and some nonferrous metals has almost been a necessity due to the operations required to remove the scale. This was not necessary in aluminum due to its inherent surface brightness. However, the oils used in cold rolling have caused the industry trouble. Comparatively low temperature of annealing does not allow the oil to burn completely off the material but oxidizes and causes staining.

Installation of protective gas generating equipment in conjunction with annealing furnaces has created the production of a better product. It is not only free of the objectionable rolling mill oil stain, but also has a thinner coating of aluminum oxide which is present on every piece of aluminum. This thinner coating of aluminum oxide gives a brighter surface sheet and also greater forming and drawing die life.

Mr. Rave

Defense uses and stockpiling continued to be strong influences in magnesium production during 1953. Since 1949, when output was 11,598 short tons, production climbed to 15,726 tons in 1950, 40,881 tons in 1951, 105,821 tons in 1952 and 92,940 tons in 1953. (Fourth quarter, 1953, output is estimated at 18,900 tons.)

Prospects for 1954 are on the same pattern as the last half of 1953, with possibility of some decrease in output if government stockpile is further curtailed. Total use of magnesium in 1953 was approximately 45,000 tons, up from 42,000 tons in 1952. Increased usage has been in primary ingot—largely in aluminum alloying and titanium production, in sheet for aircraft and printing plates and in cathodic protection.

Promising fields for future growth are automobile die castings, graphic arts and titanium production. Prospects are for continuance of development away from dependence on military applications. Considerable research is being done in production of primary magnesium and uses for the metal.

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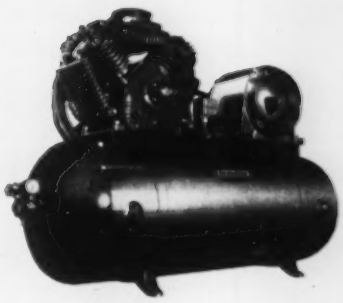

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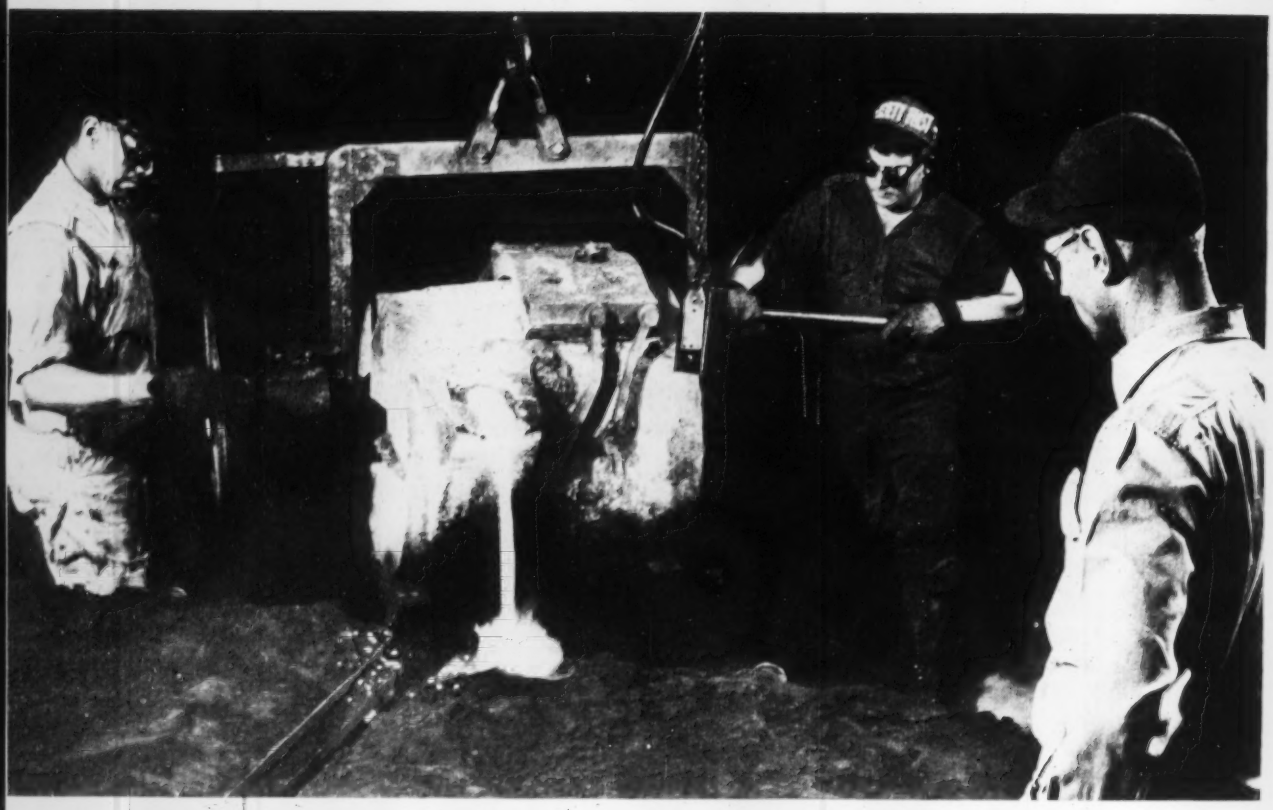

TECHNICAL PROGRESS

Casting

USERS of castings this year will profit handsomely from the extensive research and testing which has been pursued in every department of the foundry industry.

This research and investigation has concerned itself with raw materials, molding procedures, metal melting, and the like. Effort has resulted in better manufacturing methods and improved physical properties of the product, and in many cases it has produced lower unit costs. But regardless of where the benefits fall, users of the foundry product stand to reap the advantages.

Particularly outstanding has been the technological advance in shell molding. Future possibilities continue tremendous as this comparatively new procedure finds its proper economic niche. But even more, the process has resulted in a greater quality consciousness which extends throughout conventional foundry practices.

Marked expansion in use of pearlitic malleable iron castings likewise is notable, providing an engineering material of exceptional promise. In both the ferrous and nonferrous metals there are improved alloys to provide higher strengths, high temperature resistance and other attributes required by a jet and atomic age. And in 1954, the foundry industry will push its frontier farther ahead.

Mr. Yearley

After 10 or 12 years of production testing this last year has seen a wide acceptance of pearlitic malleable as a material which lends itself to differential hardening, either by the electric or flame process. This material can be cast as readily as conventional malleable because up to the final heat treatment it is the same as malleable. However, a different heat treatment changes the usual soft ductile malleable into a much stronger material which can still be readily machined and can also be differentially hardened.

Last year saw some activity and the coming year will see a considerably greater amount of activity in the malleable foundries of the country to adapt the shell molding process to malleable castings. The possibility of this process for obtaining greater dimensional accuracy has not been overlooked. However, there are many problems which must be worked out before commercial production is possible.

Mr. Roberts

Development of new foundry techniques, as well as refinements in standard methods of melting and molding, have vastly improved the quality and production of brass and bronze castings in recent years.

Engineering advantages of brass and bronze is attracting more attention. Considerations such as high strength, resistance to cavitation, erosion, fatigue and impact, are becoming more important in the selection of an alloy than the mere fact that the material resists corrosion. This situation has led to the wider use of certain bronze alloys which have been developed to provide one or more of the desired physical properties.

Although much data has been accumulated on the basic engineering characteristics of brass and bronze casting alloys, there are still many gaps in present knowledge. It is encouraging, however, that the brass and bronze foundry industry as a whole is beginning to realize the benefits resulting from industry-wide cooperation and interchange of ideas. This is the only sound basis upon which to build for future development of better alloys and methods.

Mr. Post

In the last few years great developments have been recorded in the field of casting manufacturing. Numerous techniques and processes utilizing close metallurgical controls have been developed. A significant share of the laurels must be credited to foundry equipment manufacturers who have made substantial contributions to ever greater productivity with increasingly efficient tools and machinery. Result is that the heavy metals industry is producing machinery at lower cost, yet possessing more exacting dimensions.

Castings have played an important part in the manufacture of heavy-duty equipment, especially in the field of transportation, rolling mill equipment and hydraulic presses.

Castings have always withstood the tests of specifications. In the future the industry will refuse to be satisfied with an already excellent product, but will strive for even greater progress to meet the demands of its customers.

Mr. Lazzara

Investment casting has grown from a World War II baby to a $125 million business. Ability to produce a better and more uniform product is responsible for growing acceptance of the process. Lower prices will result from improved production techniques, new less expensive investing materials and more economical pattern materials. Average weight of a large casting a few years ago was about 1 pound; today it is around 4 pounds. Many foundries successfully produce parts weighing up to 20 pounds.

Today, castings feature better dimensional and metallurgical control. New melting equipment gives closer chemical control of alloys and insures more uniform results in heat treatment of the castings. Tolerance limitations are narrowing as experience teaches the investment foundryman how to make uniform molds, control metal and metal temperatures and collect vital production control information.

From a limited selection of alloys available formerly, the buyer now can choose from over 150 ferrous

B. C. YEARLEY
Director Applied Research, National Malleable & Steel Castings Co., Cleveland

JOHN S. ROBERTS
American Manganese Bronze Co.
Philadelphia

MARSHALL POST
Vice President, Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa.

V. S. LAZZARA
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J. DONALD ZAISER
President, Ampco Metal Inc.
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W. B. WALLIS
President, Pittsburgh Lectromelt Furnace Corp., Pittsburgh

S. C. MASSARI
Hansell-Elcock Co.
Chicago

L. J. WISE
Vice President, Chicago Malleable Castings Co., Chicago

and nonferrous materials. Investment casting now offers a greater variety of alloys than any other metal fabricating procedure. New techniques now permit the production of castings far more complex than formerly, thus some previous limitations are disappearing. Another indication of progress is that the industry now has its own enginering society—the newly formed Investment Casting Institute.

Mr. Zaiser

With average cost of copper-base materials at a record high, new production methods are needed to cut costs. Greatest saving can be realized by using less material and eliminating processing operations like machining. In casting certain nonferrous materials, especially the tin bronze alloys, a micro shrinkage occurs that makes it necessary to cast excess metal to obtain a satisfactory end product. This is true even with centrifugal casting.

The sand resin or shell molding process is saving metal costs through better dimensional control, cleaner surfaces and sounder metal structures. A tin bronze alloy used for a bushing 3.5-inch OD with a 0.250-inch wall and 2 in. long was made both by centrifugal casting where a cylinder would yield five bushings and the sand resin process where six castings would result. Cost of the castings by the two procedures was about equal. From this point on, however, a further saving of material and processing is realized from shell molding.

With the centrifugal process, the end product was 23.5 per cent of the weight of metal cast, and rough machining was necessary to remove about 0.150 inch of metal per side before finishing. With the sand resin method, the end product was 38.5 per cent of metal cast, an increase in yield of 68 per cent. Only 0.030 inch of metal was removed per side, eliminating rough machining and saving 70 per cent of the borings.

Mr. Wallis

Manufacturers of foundry equipment in the United States are ahead of their European friends from the standpoint of engineering design. This statement stems from an observation of equipment in European foundries. Emphasis of this is the fact that European manufacturers are taking out licenses to make American equipment abroad.

Development of thoroughly engineered foundry equipment has resulted from American manufacturers working together for 36 years. The most active group in the industry at the moment is the Dust and Fume Control group, which is attacking the vital problem of dust and air pollution. Interest in this subject is being spurred by pressures on the foundry industry from various directions.

There has been some criticism in foundry quarters that equipment makers spend too much time on design of equipment and selling of it and not enough in working with the customer on the specific application of the equipment.

Foundry equipment manufacturers have enjoyed a nice business abroad. But under present conditions builders of custom made equipment are priced out of the export market. The option is to arrange to build equipment abroad.

Mr. Massari

Large sums were spent last year and are continuing to be spent to improve foundry processes and reduce manufacturing costs. These include elaborate sand handling equipment, automatic sand reconditioning facilities, new and improved molding and coremaking machines, and better methods for finishing castings to minimize subsequent work to prepare them for ultimate use. Most important from the consumer's viewpoint is closer control of mechanical properties and narrower dimensional tolerances for castings made in green sand molds.

New processes in active development are shell molding, high-pressure molding, and "D" process. An outstanding development, the shell process, already has achieved a tonnage position. At least for smaller castings the process makes possible closer dimensional control and better casting finish than usually achieved with green sand methods. The process is young and yet must find its true economic status.

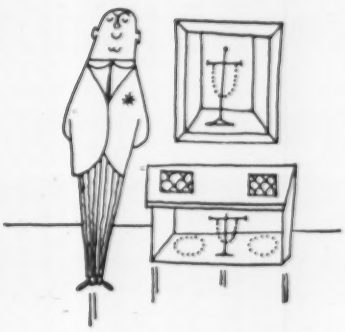
Similarly, the new pressure molding methods being developed for green sand and the so-called "D" process have as their ultimate goal closer dimensional tolerances, more faithful reproduction of the pattern and improved economy.

Mr. Wise

Production of malleable castings is essentially material handling and metallurgical control. One is compelled to stress those developments related to metallurgical control, because the tremendous improvements in material handling apply to the entire foundry industry rather than to malleable foundries alone.

Each year brings new evidence of the versatility that is inherent in white or "hard" iron. This versatility makes possible through various heat-treating cycles the production of a wide range of mechanical properties within commercially controllable limits. A.S.T.M. now recognizes two grades of completely graphitized malleable iron and five grades of pearlitic malleable iron.

A number of producers have suc-



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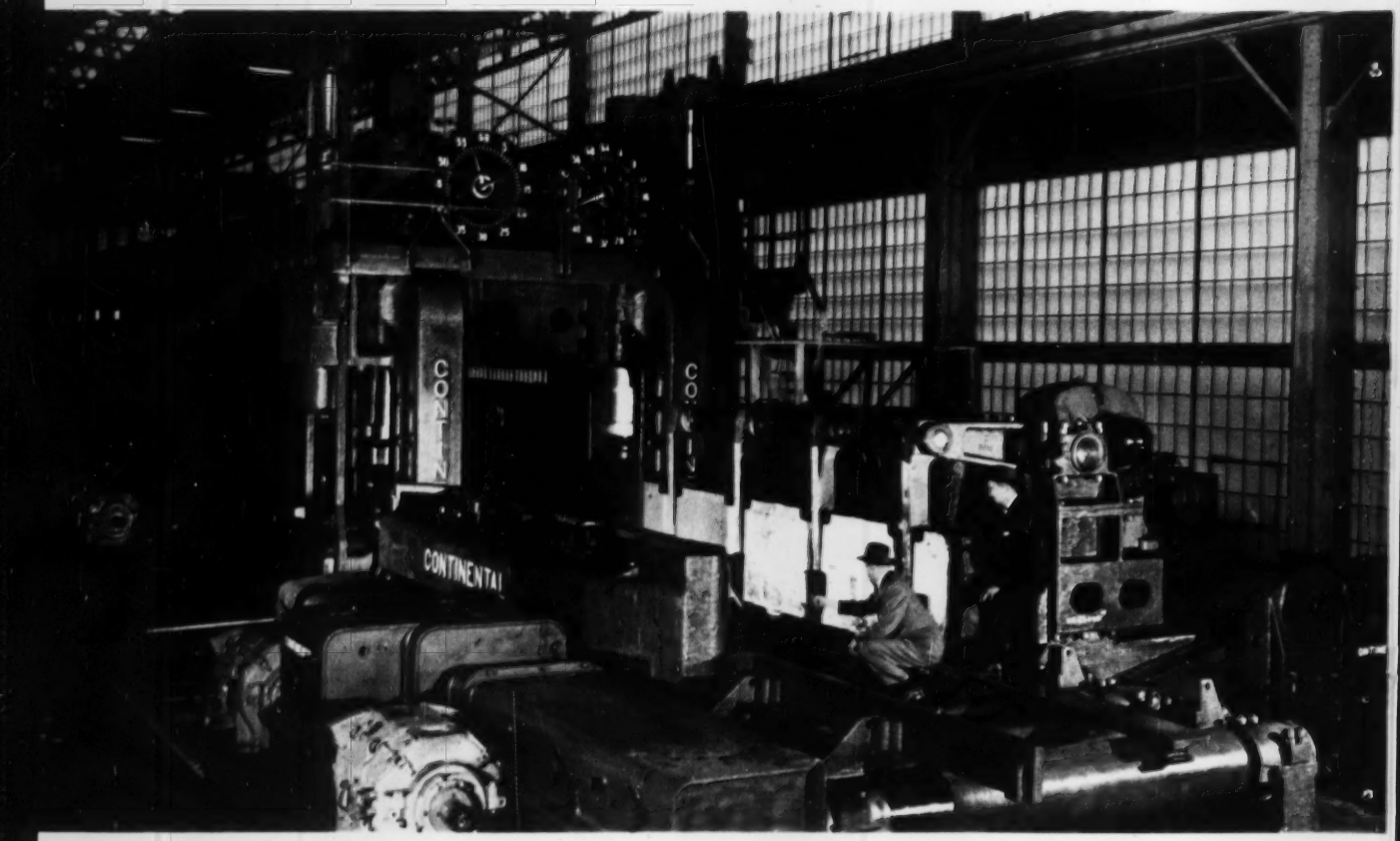

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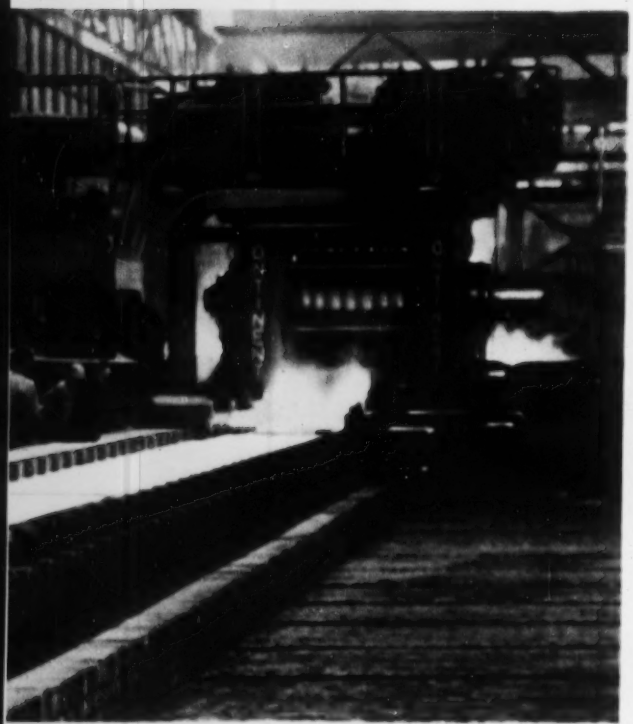

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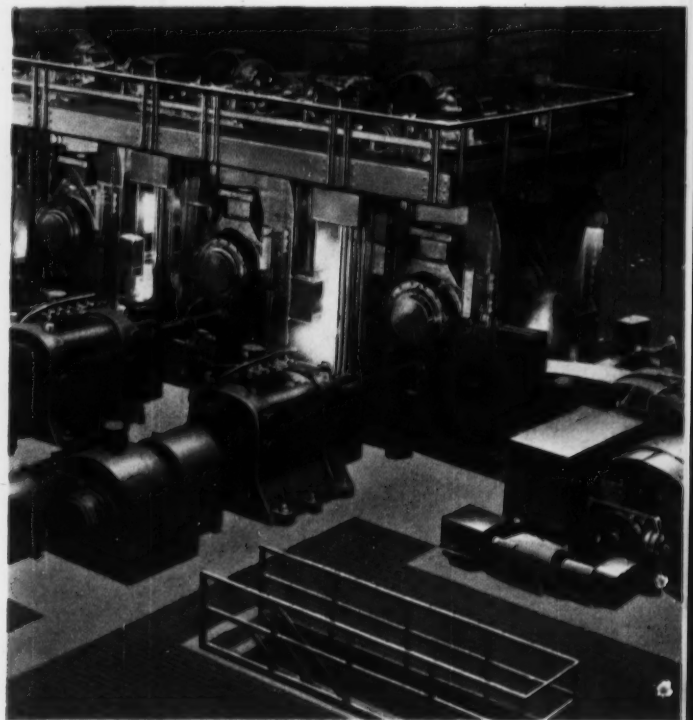

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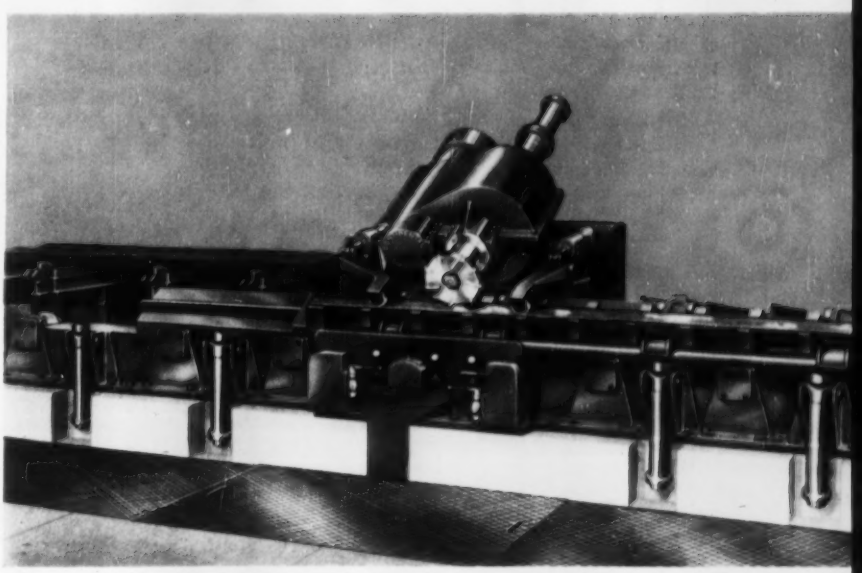

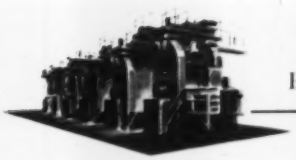

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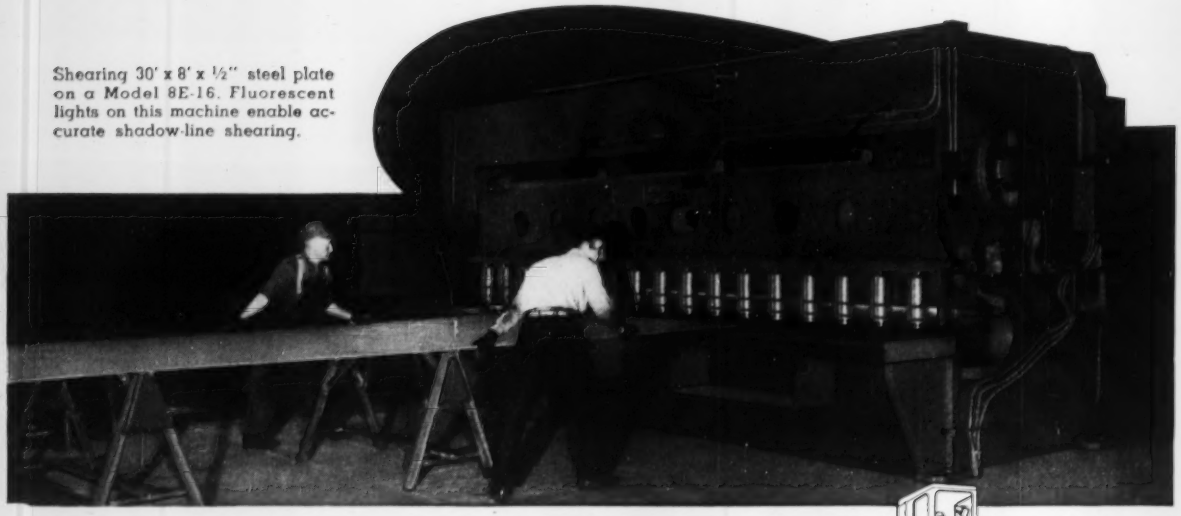


Shearing 30' x 8' x ½" steel plate on a Model 8E-16. Fluorescent lights on this machine enable accurate shadow-line shearing.

Smooth, Accurate Shearing Aids Warner & Swasey Gradall Production

Gradalls are made by the Gradall Division of The Warner & Swasey Company.

A Steelweld Pivoted-Blade Shear cuts all the plate used in the manufacture of Warner & Swasey's Gradall Multi-Purpose Earth-Moving Machines.

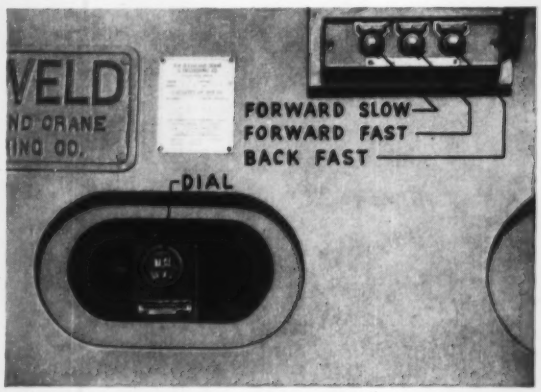
Because of the simple Micro-Set knife clearance adjustment it produces clean, sharp cuts to close tolerances in various thickness metals ranging from light gauge to ½".

The motor-driven back gauge is very popular with the operators because of the ease and speed with which it can be set. Simply by pushing buttons at the middle front of the machine and reading a dial which records to 1/64 inch, the gauge is quickly positioned exactly as required.

Steelweld Shears and Gradalls are alike in many respects: Heavy all-welded construction — Many new and revolutionary features — Entirely different in operating principle from other similar-purpose machines. Both speed the work and cut costs.

If you work with metal plate of any kind, you should have the facts on Steelweld Shears. A Steelweld representative will be glad to call on you at your convenience.

Dial and control buttons conveniently located at middle front of shear for setting motor-driven back gauge.



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STEELWELD PIVOTED BLADE SHEARS

T. E. BARLOW
Sales Mgr., Eastern Clay Products
Int'l. Mineral & Chemical Corp., Chicago

JAMES H. SMITH
General Mgr., Central Foundry Division
General Motors Corp., Saginaw, Mich.

WALTER E. SICHA
Chief-Cleveland Research Division
Aluminum Co. of America, Cleveland

JAMES H. LANSING
Technical & Research Director
Malleable Founders Society, Cleveland

cessfully developed completely graphitized products having substantially higher tensile properties than the standard grades by use of alloy additions to the white iron base metal, while still others combine the use of alloys with special heat treatment in their production of pearlitic malleable and martensitic cast iron. The full potential of the variety of properties attainable through alloying and/or heat treatment of white iron base metal still remains to be developed.

Mr. Barlow

High pressure molding has received increasing attention and is expected to attain commercial production this year. The object is to improve casting dimensions and tolerances for purpose of minimizing machining operations and increasing engineering efficiency of cast products. Essentially the process is to modify existing foundry practices by increasing the squeeze pressures during the molding cycle thereby pushing the sand grains closer together and creating a mold of increased density.

Actual technique of developing high pressure molding involves improvement in both equipment and in sand bonding materials. As to equipment, a major development has been commericial utilization of diaphragm squeeze or contour molding. A flexible rubber diaphragm is used in contact with the sand so as to transmit pressures from 100 to 175 lbs. per sq in. directly to sand in the flask. Sand must have extreme flowability and be of a type to permit high densities without developing such defects as blowholes or expansion scabs. A new method of bonding with plastic resins handles both sand problems.

This method of molding has been used successfully on a semiproduction basis in gray iron, nodular iron, malleable, aluminum, brass and bronze. It has not yet been demonstrated in steel but such work is being started. The system is adaptable to normal foundry practice and its inherent economies are expected to carry it far.

Mr. Smith

Foundrymen consider the shell molding process one of the most important developments of our time. Recent developments and future improvements may revolutionize techniques to the point where it will be more economical to produce most small castings and some large castings by shell molding.

Two important advantages of the process are the drastic reduction in the molding material handled—the sand requirement for shell casting is approximately one-eighth of that for the green sand—and adaptability of the operations to complete mechanization.

Cost of the phenolic resins used to provide the bond for the silica grains in construction of the shell is the main reason for the process not being more widely used. There seems little chance of reducing the present high cost of phenolic resin because of the stable price of phenol. Manufacturers are striving to discover suitable resin substitutes and resin extenders but even at present high resin cost, many castings can be produced at a cost comparable to green sand molding. This is particularly true where cores can be eliminated.

Mr. Sicha

Several recent developments provide promising prospects for aluminum alloy castings. Service tests demonstrate the possibility for expanded use of die castings for more highly stressed structural parts such as automotive clutch housings. More extensive use of the permeable plaster casting process can be expected in view of the superior dimensional accuracy and surface smoothness attainable.

A recently developed permanent mold alloy of the Al-Si-Cu-Mg type in the heat-treated condition, providing higher yield strength with required elongation, should find extensive application, especially in aircraft structures. Aluminum casting alloys with higher tensile properties at about 600° F have been developed and will be commercially available within the year.

An expanded market should develop for aluminum-tin bearing alloys because of the introduction of sand and permanent mold casting bearings measuring 40 inches in diameter for rolling mills. Automotive cylinder heads of cast aluminum are available as optional equipment on some automobile engines and the trend toward higher compression ratios could increase the demand for aluminum cylinder heads.

Mr. Lansing

Outstanding recent development in malleable castings is the marked expansion of pearlitic malleable use. This applies both to grades produced to A.S.T.M. Spec. A 220-50, and to similar grades following localized hardening. Minimum strengths range from 60,000 to 90,000 psi, yield points from 43,000 to 70,000 psi, elongation values from 2 to 10 per cent. Typical indicated brinells range from 163 to 285. An excellent example of hardened pearlitic malleable is the automotive valve rocker arm, having wearing surfaces hardened to 55 Rockwell C and being successfully and economically used without a bushing

Other pearlitic malleables are being increasingly used where higher hardness than that of standard mal-

leable is required. They do not replace standard malleables but rather, advantage is taken of their castability and machinability, to cause their specification in applications where otherwise steel forgings might be designated.

Standard malleables produced to A.S.T.M. A 47-52 are increasing their use where low temperature impact properties are of value. Malleable loses little, if any, of its resistance to impact at low temperatures, when produced for such service.

Mr. Pellini

Vacuum melting and casting has moved from a laboratory tool to an industrial process with an output in tons per month for a variety of metals. Initial industrial use concerns problem metals which are highly reactive to atmospheric gases and those with special characteristics which can be enhanced by elimination of gases or impurities. Examples are titanium and zirconium and metals for electronic and magnetic use.

Considerable effort is directed toward vacuum melting and casting of more commonplace metals, this arising from expectation of possible increase in strength, ductility or soundness. This effort is mostly exploratory and much of the information derived is withheld for security reasons. Future here is promising.

Cases of improved tensile strength and ductility of a wide variety of metals have been demonstrated. Fatigue life of high-strength alloy steels is increased markedly due probably to increased cleanliness. For highly stressed parts requiring elaborate machining and surface finish, increased metal cost may be offset by longer life expectancy or higher stress allowance. Elimination of porosity and improvements in pressure tightness of nonferrous castings by vacuum melting or degassing after melting have been demonstrated clearly. High cost of equipment to develop high vacuum discourages vacuum methods for foundry use.

Mr. Operhall

With the advancements in jet engines, investment casting is called upon to produce components for the turbine sections of these engines which operate at extremely high temperatures and stresses. These components, which for the most part contain iron as a contaminate, are extremely difficult to forge and machine and therefore must be accurately produced by foundry processes. They must withstand metallurgical scrutiny by zyglo and x-ray; must be capable of withstanding and meeting stress ruptures at elevated temperatures for extended periods of time; have surface qualities in the range of 60-80 rms; and be dimensionally accurate.

It is quite apparent, in summarizing the requirements for a gas turbine component, that exceedingly close controls must be exercised in all phases of the foundry operation. In addition, it is obligatory to isolate lots of castings by heats, cross-relate them to ductility and subsequently keep castings from metallurgically approved heats only.

The investment casting process, in itself extremely technical, is a high mortality type of business because of stringent inspection requirements for the gas turbine fields. Changes in gas turbine requirements complicate engineering and production procedure for investment castings. The process is certain to find increasing applications where high-temperature performance, accurate dimensions and close metallurgical control are requisites.

Mr. Valyi

Effort of the foundry industry to increase the quality and value content of its product, while effecting economies in cost of production, continued unabated during the past year, to no small extent under the impact of the shell molding technique which made substantial inroads and was advanced considerably on a technical level. The growing fund of knowledge in shell molding helped to locate the proper applications. A strong increase in the number of foundries utilizing shell molding must be expected for the coming year. In instances where shell molding does not appear to have economic justification, the newly emphasized quality consciousness has contributed to an improvement of the product turned out by conventional methods.

It is estimated that close to 80 per cent of all production foundry work may become susceptible to conversion to shell molding within the next ten years. Substantial technological changes are in store for shell molding, reducing the time of the molding cycle and the materials cost of the mold.

Mr. Schuh

No revolutionary developments made the headlines in gray iron last year—instead there was unobtrusive but progressive evolution all along the line. A change in the economic climate is fostering a powerful

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Misco Precision Casting Co.
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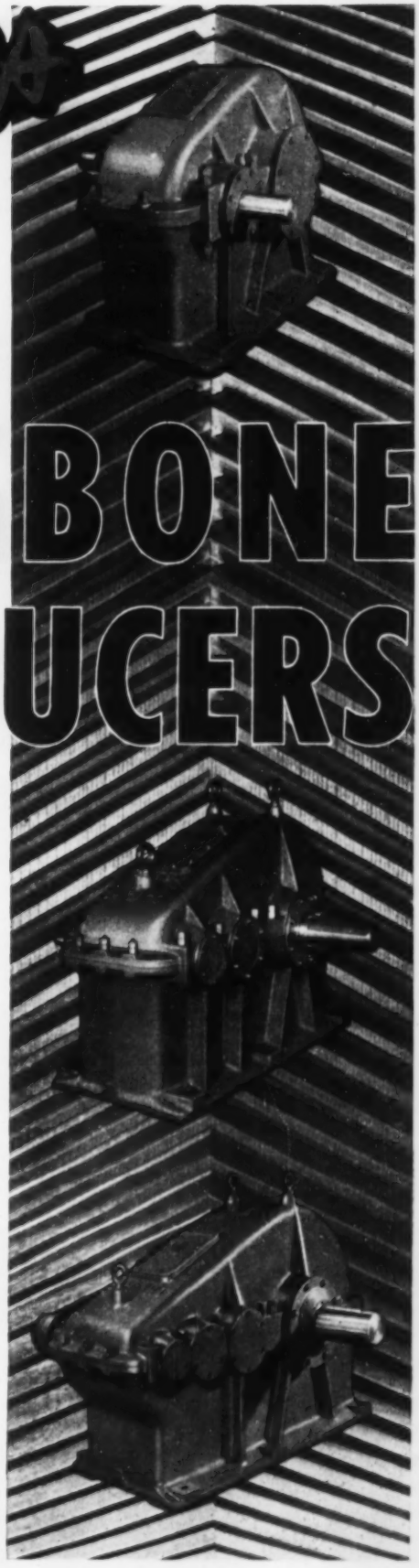

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Chief Metallurgist, Lebanon Steel Foundry
Lebanon, Pa.

trend towards re-examining all technical practices, ranging from raw materials to finished product, including such features as development and application of new tools, handling methods, plant layouts, and improving the understanding of both basic and process metallurgy.

The aim is to make a better and more highly controlled product, coupled with lower manufacturing cost. The salutary effect of the Foundry Educational Foundation is beginning to make its mark, the wider dissemination of trained personnel, among other things, accelerating the formulation of more meaningful process and product specifications. The new developments, such as shell molding and nodular iron, have emerged from the laboratory and promotional phase into rigorous manufacturing development. Their place as supplements to, rather than replacements of, customary methods and materials is becoming increasingly defined.

If the current broad-based technical evolution is sustained, the gray iron industry will not need to depend on startling new developments to assure an expanding acceptance for this highly versatile and readily castable material.

Mr. Hagans

To maintain ever increasing quality standards more steel foundries are establishing systems of statistical control. These cover all phases of production—molding, coremaking and cleaning. After the castings are made the various methods of nondestructive testing are being used as quality control tools. Use of radiographic, magnetic particle, and zyglo inspection for this purpose is spreading rapidly. These are also important tools in development of foundry techniques.

Last year saw greater use of structures made by the cast-weld method. This process is used principally where a part is too intricate in design to permit casting as a single piece. Often several cast steel components are welded together to form the complete part. Complete parts are also made by using steel castings for a portion of the assembly and structural steel for another portion, fabricating the parts by welding.

Alloy shortages because of the Korean emergency caused steel foundries to undertake research in the conservation of alloys. This research resulted in the production of castings using smaller amounts of alloys but still maintaining high specification requirements.

Work on product development engineering has continued at an increased rate. The industry is able to offer users of metal parts an important design service to insure maximum results in economy and life of finished parts.

Mr. Danks

Aircraft demand dominates magnesium sand casting production. Use of high-temperature, heat-resistant alloys undoubtedly will increase with higher jet engine operating temperatures. Such alloys as ZTI, which has excellent creep properties at temperatures up to 650°F, are being specified for more experimental work.

Larger and certainly more complex aircraft castings are to be produced in the future. Inspection standards will rise, due to more casting complexity. Quality control, maintained by rigid and time-consuming inspection steps, compounds the problem of holding costs down. As an offset, attention is being given to mechanizing production methods.

Ultimately, it may be practical for magnesium foundries to switch from gas furnace to electric melting. A 1000-pound gas melting furnace requires 1½ hours for one melt. An electric furnace of same size requires less than half this time, uses less space and provides labor saving economies. There is, however, relatively little experience in this country to prove electric melting is less expensive or comparable to gas. Electric melting recently was observed in Germany. One foundry uses the electric method exclusively. If electric melting is practical, its most significant effect may be to expand magnesium's commercial possibilities.

Mr. During

Today, an integrated die casting company is in a position to provide functional products from the die design stage, a stage where major economies to the customer are possible, to the finished product, ready for assembly. For one thing, "war time" finishes have been eliminated and we are able to provide a wide range of product treatment.

There is no question that 1954 will see a resurgence of the use of nickel plating, and the introduction of many new type finishing processes.

The industry is now on a research program devoted to even wider application of die casting, attacking those problems most pressing to the industry. Die materials are occupying major attention at the present time and it can be expected that many of the economic limitations of the process can be eliminated.

Mr. Juppenlatz

High-strength cast corrosion-resistant alloys of aircraft quality now are being produced commercially under Armco patent U.S.P. 2,482,096 and license, known as Lebanon Steel Foundry L 17. Research indicates certain desired modifications from

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J. C. FOX
Chief Metallurgist, Doehler-Jarvis Corp.
Toledo, O.

wrought alloy procedure to the cast product. Need for high-strength alloy castings with corrosion and heat resistant properties has been established, since most cast grades of 18-8 type alloys possess tensile strength levels of about 75,000 psi.

The 17-4 PH alloy in cast form has a tensile range from 130,000 to 180,000 psi, depending upon precipitation hardening temperatures of 850 to 1200° F. Elongations are proportional to strength levels and are similar to low alloy quenched and tempered cast grades.

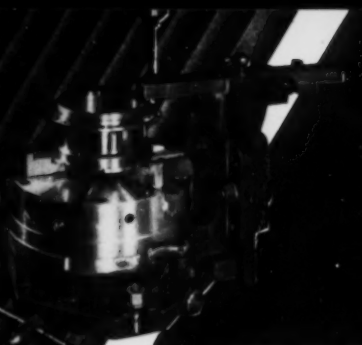
Heat treatment by air cooling instead of quenching is practical, with good machining characteristics and good welding qualities, permitting fabrication of assemblies. The alloy contains about 17 Cr—4 Ni—3 per cent Cu. without addition of critical elements. Corrosion resistance is somewhat under the regular 18-8 alloy.

More of these castings will be sought where stresses are high from high internal pressures or where weight saving is paramount. Demands for high strength materials with good corrosion resistance also are being encountered in jet engine and airframe applications.

☑ Mr. Fox

Die casting trend is toward larger and more intricate parts. Increase in casting size influences need for larger die casting machines. Until recently the largest die casting machine was capable of producing an aluminum casting of maximum weight of about 20 pounds. Now, the newest and largest in our plant will produce aluminum castings weighing approximately 70 pounds and zinc castings up to 170 pounds.

The automotive industry is becoming more weight conscious. To accomplish any lightening of cars, greater use of light metals—aluminum and magnesium—becomes imper-



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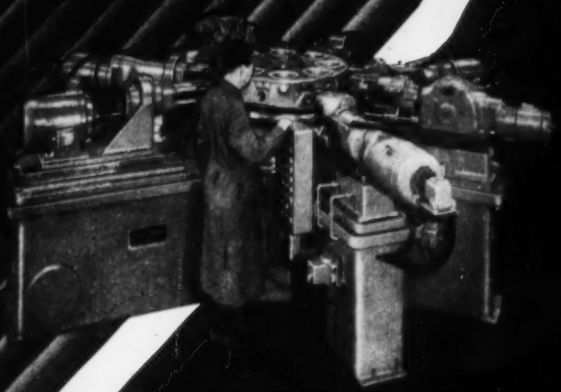

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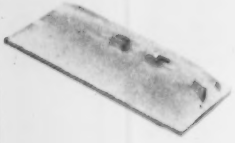

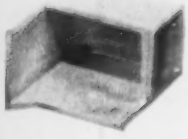

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ative. In such a program the die casting of these light metals and alloys will play an important role. With the new casting machine it will be possible to die cast many large parts that have been made by other processes. A cylinder block as an aluminum die casting is possible and if properly engineered will save weight and cost. With this machine, die casting of an instrument panel as a one-piece casting can be projected, incorporating all of the accessory parts. Side frames, deck lids and similar body parts are within technical practicability.

While this discussion puts emphasis on the light metals, zinc base die castings undoubtedly will continue to hold their present status.

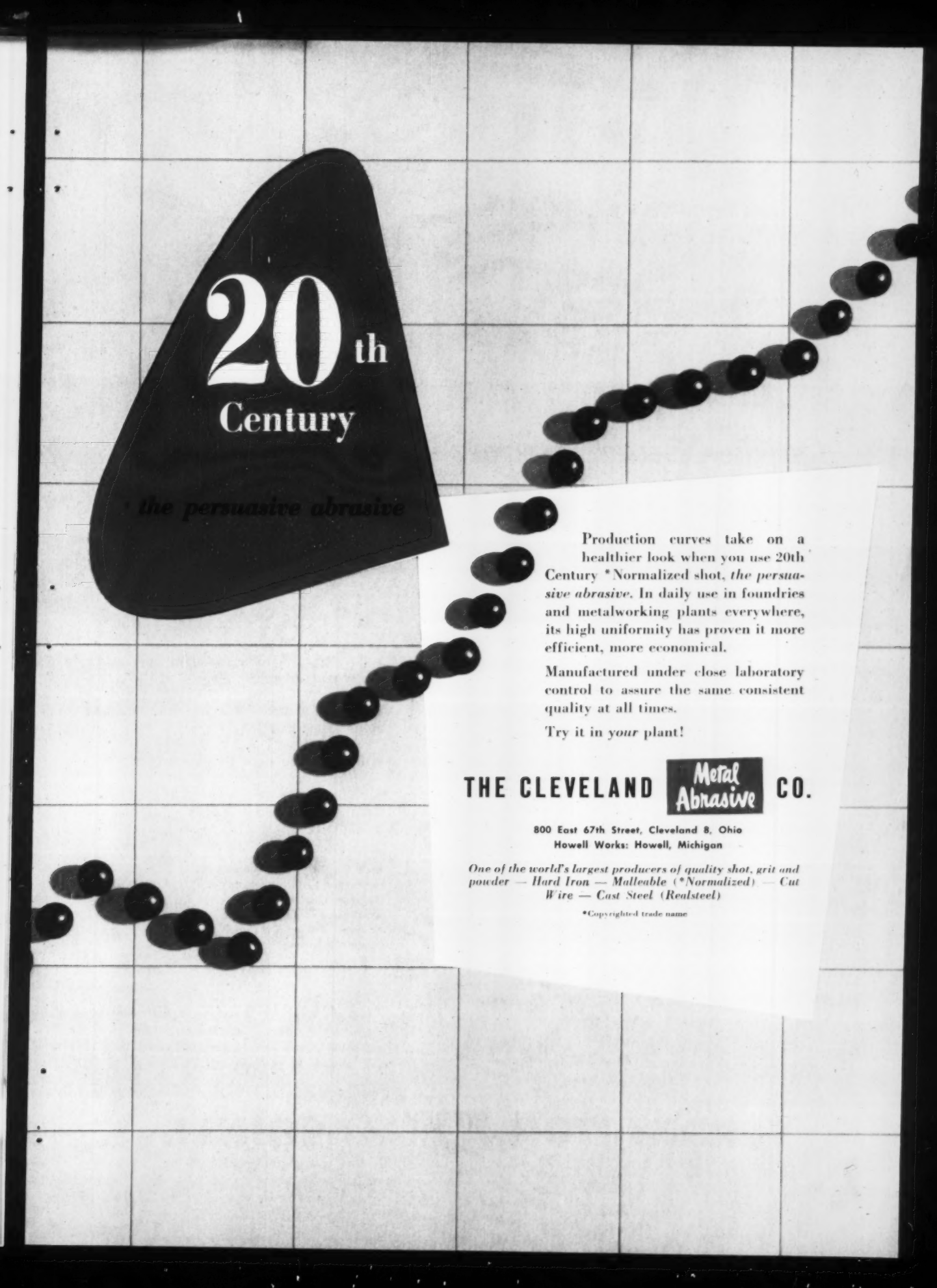
Mr. Rybka

The casting industry today produces parts that must be seen to be believed. The future promises even more. Metallurgical, physical, dimensional and economical advantages are all to be found.

Investment castings provide intricate parts that are economically impossible to produce by other means. Shell molding techniques are producing static castings with better tolerances, greater yield, fewer rejected parts and superior surface finish. Complex shapes, thin sections and larger, more dense castings are coming from foundries generally.

Centrifugally cast tubes are gaining wide acceptance where heavy walls and varying analyses are required. Any material that can be melted is available in diameters from 2 to 50 in., in walls from ¼ to 4 in. and in lengths up to 20 ft.

Some industries are using a dual-metal centrifugally-cast tube, for example, stainless steel on carbon steel. The hydraulic industry is finding sav-



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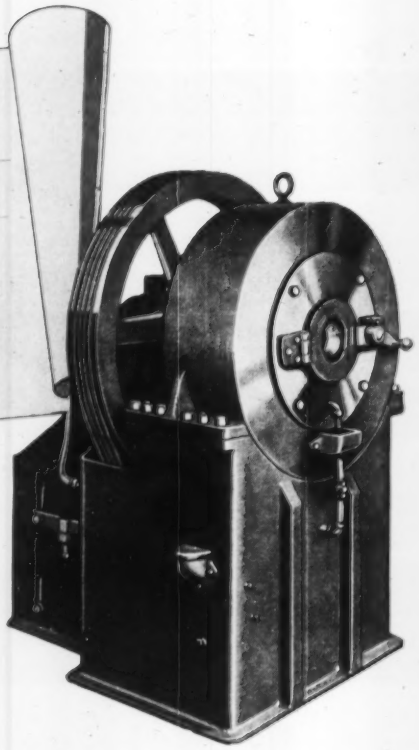

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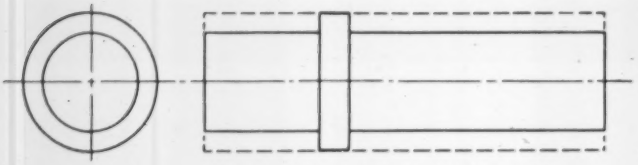
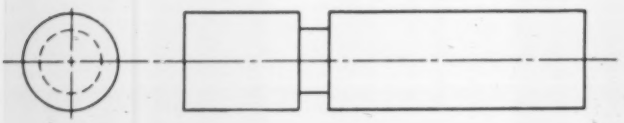
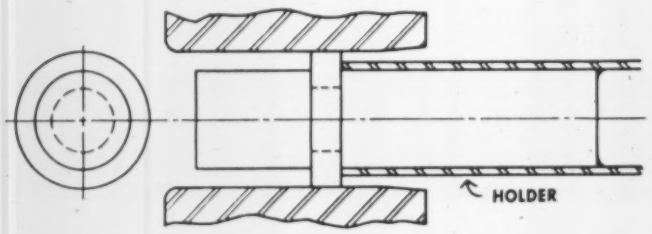


This part was originally turned on a special machine to produce the desired collar or spring seat. The dotted lines indicate wasted, excess material.

Then this manufacturer investigated swaging. Look at the results:



A blank rod with the same diameter as the turned piece was grooved. This provided the location for a ring to be positioned by means of a holder.



Then the ring was swaged firmly into place. Final results—the same as the expensive screw machine piece.

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Chicago

ings in centrifugal tubing due to the flexibility of process dimensionally and the high physical properties. Centrifugal tubing is reported to withstand higher internal pressures than forgings of equal wall thickness and analysis. Acceptance of this material has reached the point where it is available from warehouse stocks.

Mr. Vanderhoof

Progress in the die casting industry, particularly during the last decade, has been at an astounding rate. The future brings a challenge to meet increasing demands, and further refinements now being worked on must be brought to a satisfactory conclusion. The process itself, and the potential scope of possibilities within the field of metals that can or may be cast, insure exciting developments in the near future.

For many years the job shop die casters have enjoyed an established medium for collaboration on their mutual problems through the American Die Casting Institute. Safety, engineering and metallurgical problems are among major activities continually worked on. Other important projects sponsored are the Certified Zinc Alloy Plan, which insures the high-quality base so important to zinc die castings, and the research and development program, which includes expanding the economies of die castings to the higher melting point alloys. Research programs in the active stage concern die steels and lubrication materials.

Hope is that out of this intensified effort will come a better service, a better product, a wider scope of operational possibilities and many fixed yardsticks tied down to specific cycles of our process. The goal is to rank near the top of those processes serving product manufacturers who want large volume, exacting finish, dimensional accuracy and durability.

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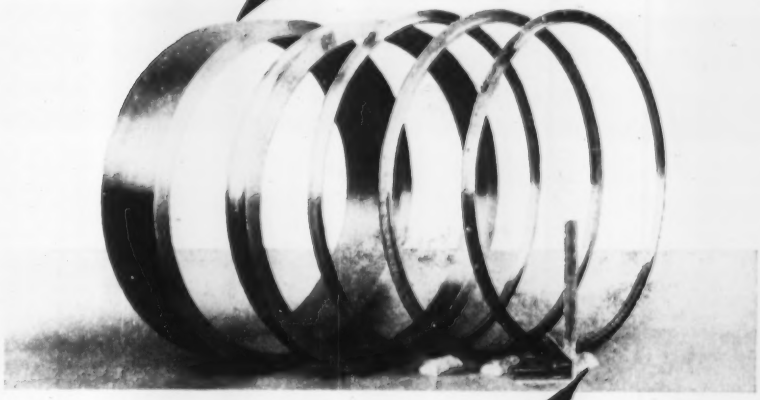

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Centrifugally cast metal gives an exceptionally fine, dense, uniform grain structure. The strength of the metal approaches that imparted to a bar or ingot when it is hot forged. It produces an ideal metal for the tough service required of jet engine parts.

Incidentally, as evidence of our knowledge of and experience with tough alloy castings — static as well as centrifugal — the records show very few rejections by this engine manufacturer who subjected each of the many rings we furnished to his own very rigid tests.

May we suggest that you let Duraloy work on your high alloy castings — chrome iron, chrome nickel or nickel chrome? We have the experience and facilities for turning out high quality castings.

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TECHNICAL PROGRESS

Materials

LIFTING of government restrictions the past year gave manufacturers a wider selection of metallic materials, but they will be substitute conscious for a long time.

Great range of adequate alternate materials—not substitutes—is being developed. Certain TS steels, like some NE steels, seem destined to remain in general use. This alloy conservation may be a long-term proposition.

Availability and properties of high temperature materials limit jet-engine development. Large segment of this country's metallurgical research is being aimed at metals, cermets, borides and a host of other high temperature compounds for turbine and atomic applications. Progress will depend as much on finding new materials as on design details.

Biggest titanium headache is quantity production. Output is being steadily increased, but the day of general availability is still an X value.

Newer metals are fighting to gain a foothold; old standbys, such as the irons and steels, are being improved to the point where they must be reappraised because of better properties. Manufacturers constantly strive to make their products smaller, lighter and stronger. Attention is focused on materials with better strength-weight ratios. Here, both steels and the light metals are making gains.

While high-quality materials are needed, their ultimate success depends heavily upon intelligent use. Proper application and slight modifications will give better and cheaper products.

☑ Mr. Garwood

There will be a number of modifications of present materials which will greatly improve their usefulness and performance in specific applications. As an example, we are just beginning to learn about rare earth additions and effect of additives such as hydrogen, nitrogen and oxygen on various metal alloys. This is conclusive proof that although our present knowledge of metallurgy alone is great, we still do not understand many basic underlying principles. We do not know why metals behave in the manner they do.

Accelerated research in the fields of chemistry, physics and metallurgy is capable at any time of disclosing information which will vigorously affect our entire economy. It is my opinion that the majority of the effort for the next year at least will be directed toward better use of basic materials now available. We have hardly begun to exploit our knowledge of the materials we have. When this is done, proper application and slight modifications will result in both better quality and cheaper products.

Expanded use of relatively new materials, such as plastics and so-called synthetics of all types, is bound to increase our knowledge of these materials and substantially improve them.

☑ Mr. Feild

A development possessing great importance for both peacetime and defense applications is the extensive use of the remarkable precipitation-hardening grades of stainless steel. This new type of steel is being proalone is great we still do not under-

and Metallurgy

M. F. GARWOOD
Chief Materials Engineer
Chrysler Corp., Detroit

A. L. FEILD
Associate Director, Research Laboratories
Armco Steel Corp., Baltimore

T. S. FITCH
President, Washington Steel Corp.
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M. W. DALRYMPLE
Metallurgical Engineer
Bethlehem Steel Co., Bethlehem, Pa.

in form of sheet, strip, bars, wire, forgings and castings. Suitable welding, forming, heat treating and machining techniques have been evolved by producers and fabricators. Specifications have been adopted by a number of agencies and individual users and detailed technical data are available in published form.

These precipitation-hardening alloys, of which Stainless W, Armco 17-7 PH, and Armco 17-4 PH are representative, are something entirely new in the stainless steel product field. After hardening, they have a high strength-weight ratio and they retain a relatively high proportion of their strength up to a moderately elevated temperature range (500-800° F.) Possessing corrosion resistant properties, they are characterized by high yield and tensile strength after low temperature hardening (850-1050° F).

Furthermore, a grade such as 17-7 PH is austenitic in solution-treated condition. It can be successfully subjected to severe forming operations prior to hardening. These steels are finding increasing use as components in aircraft, guided missiles, helicopters, atomic energy units, and, less spectacularly, as springs, valve parts, carpenter's hand saws, diaphragms and precision castings.

☑ Mr. Fitch

Those of us who produce and sell cold-rolled stainless steel sheet and strip are, in most cases, selling "surface". Since stainless steel is a relatively expensive material, one way in which to reduce cost per end product is to reduce the thickness of stainless steel employed. Problems such as rigidity must be solved in some cases, and sometimes there are special fabricating problems.

A good example is the curtain wall panel. Some designs employ stainless steel, 0.031-inch thick, whereas other designs permit the use of stainless steel sheet and strip as thin as 0.014-inch. There is a growing demand for very thin cold rolled stainless steel where weight is an important factor. Insulating blanket on a jet propulsion tube is a good example of this; stainless steel 0.002-inch thick is now used.

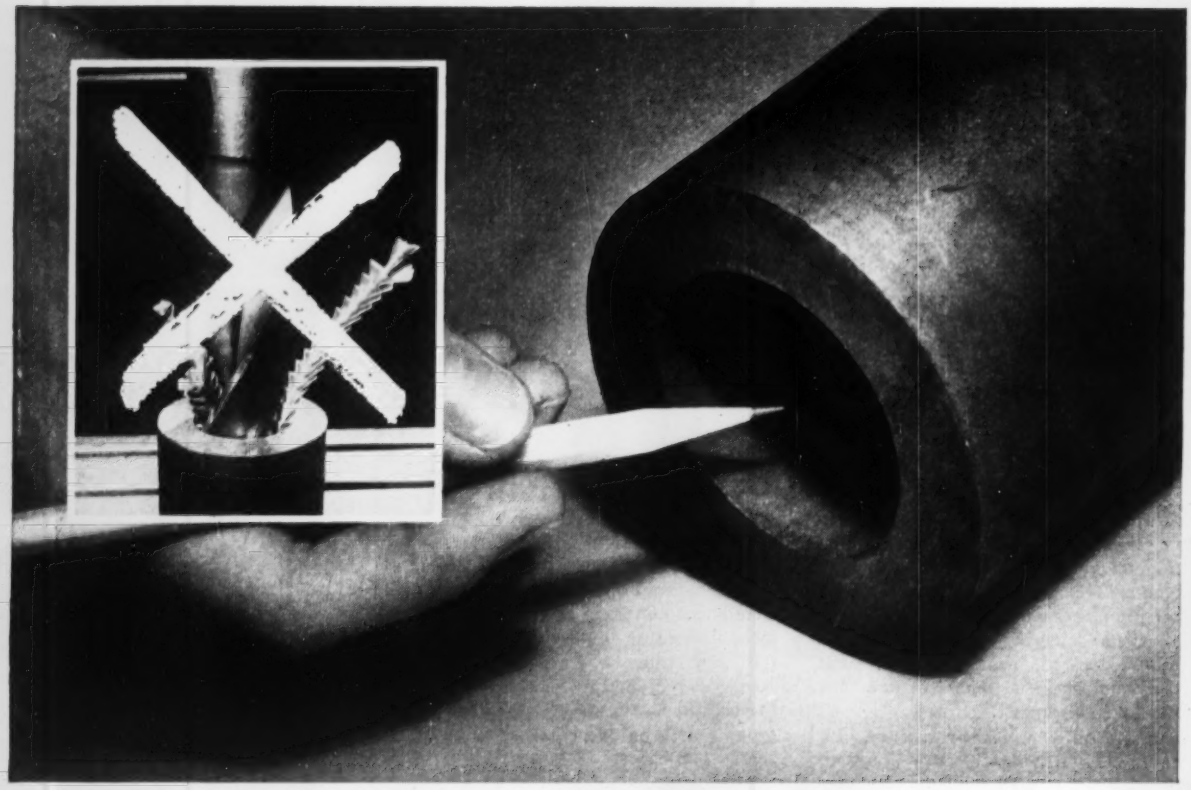
Other applications already effected or in development are weather stripping, camera components, outdoor movie screens, flexible hose, reflective insulation, and jewelry. We believe the field for thin stainless strip will expand rapidly in the future.

We anticipate that there will be considerable development in the near future on analyses of austenitic stainless steel which employ a lesser percentage of nickel. This will permit production of a larger tonnage of stainless steel without increasing nickel requirement.

☑ Mr. Dalrymple

Event having the most profound effect in 1953 on materials and metallurgy undoubtedly was cessation of battle action in Korea. Raw materials became available; controls were removed and consumer metallurgists again could secure steel containing nickel and molybdenum in amounts customary before July, 1950. This circumstance relieved pressure on alloy steel buyers to accept Tentative Standard (TS) steels that were offered during the period of alloy scarcity. However, certain TS steels, like certain NE steels of World War II, seem destined to remain in general usage. As a result, conservation of alloys, effected by their use, may continue for a long time.

Another factor promoting conserva-



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YEARS AHEAD—THROUGH EXPERIENCE AND RESEARCH

SPECIALISTS IN FINE ALLOY STEELS, GRAPHITIC TOOL STEELS AND SEAMLESS TUBING

C. L. CLARK
Metallurgical Engineer, Timken Roller Bearing Co., Canton, O.

KENNETH D. MANN
President, Firth Sterling Inc. Pittsburgh

HOWARD E. BOYER
Chief Metallurgist, American Bosch Corp. Springfield, Mass.

A. J. LANGHAMMER
President, Amplex Oilite Products Chrysler Corp., Detroit

tion of alloys is tendency of metallurgists and engineers to meet the need for increased strength and hardness in steel parts by cold working, instead of by increasing the alloy content. Most far-reaching of the cold-working methods, in its effect on industry, is the extrusion process. It provides a means for production of many high strength parts at great savings in alloying elements, heat treating expense, and machining losses.

To steel producers this process presents, among many, two important problems: 1. Production of low carbon content steel bars and billets of exacting standards of surface and internal quality suitable for cold extrusion. 2. Necessity to provide high grade tool and die steel able to withstand the terrific pressures utilized in these operations.

Mr. Clark

There is increasing demand for tubing to withstand higher pressures and temperatures. For instance, in production division of petroleum industry a yield strength of 80,000 psi (API Grade N80) was, until recently, considered ample for oil and gas well tubing for the most severe conditions. Now, with many well depths exceeding 10,000 feet, requirements for yield strength of 95,000 to 110,000 psi are not uncommon. Since for certain of these applications it is desired to keep the hardness as low as possible, to avoid stress-corrosion failures, close control of physical properties is necessary.

In chemical industry, many units are operating under pressures of order of 35,000 psi with metal temperatures to 600° F. Tubes required to withstand these conditions usually have an OD to ID ratio of 3 to 1 and even then special precautions must be taken in producing them if premature failures are to be avoided.

Maximum operating condition in steam generating field is 1100° F steam temperature and 2500 psi. A recent innovation is use of two parallel, rather than a single, piping system from boiler to turbine. This permits use of a smaller diameter pipe which in turn decreases fiber stress in the wall and thus the wall thickness. It also permits use of seamless pipe, rather than more costly forged and bored product.

Mr. Mann

Last year saw increased activity in the development of new materials for what might be called the Jet and Atomic Age. More efficient operation of nuclear reactors, gas turbines and jet engines will depend as much on the development of improved materials as upon the details of design. Modern metallurgical research is devoted in a large measure to such materials particularly in the field of cermets, borides and a whole spectrum of new and theoretical compounds.

On account of highly corrosive and oxidizing conditions, many of these compounds cannot even be produced until new materials are developed to contain them in the process of production. Radiation damage also poses new problems to metallurgists who are now at work in the fields of heavy metal, beryllium, and zirconium.

Mr. Boyer

As demand increases for greater strength values from less weight and volume of material, the search is being extended much farther than composition and normal heat treatment. Engineers are fully aware that strength values normally obtained in practice often fall far short of theoretical calculations. One prime reason for this: Failure to take advantage of residual stresses, thus allowing them to detract from rather than to increase strength values.

It is now common practice to employ heat treatments merely to obtain a favorable condition of residual stresses even though other properties not normally required are obtained from such treatments. An example of this is the use of nitrided surface for the prime purpose of placing the surface layers in a state of compression. Carbon control in carburizing is also a valuable contributor in establishing favorable stress conditions. Much credit is due to those who have perfected means of measuring residual stresses. It is always necessary to know the cause before a suitable cure can be prescribed.

Mr. Langhammer

Appreciable progress was made in the field of powder metallurgy during 1953. Continued progress is expected in 1954. Increasing number of finished machine parts are being fabricated of brass powder. These are for both defense projects and civilian use. Iron powders of good quality and in large quantity are now available.

At the outbreak of the Korean war, about 600,000 pounds of iron powder were produced per month in the United States. One plant recently put into operation has a capacity of 5,000,000 pounds per month.

Old line U. S. manufacturers increased their capacity and several newcomers with great potentialities and resources are entering the field. Thus, the vicious specter of insufficient iron powder that caused so much uneasiness no longer exists for both defense and civilian requirements.

Powder metallurgy is continuing to make contributions to our Armed Forces. Generally the quality of the end product is improved, attractive savings are effected, and quantities

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HIRAM BROWN
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Solar Aircraft Co., Des Moines, Iowa

J. F. KLEMENT
Technical Director, Ampco Metal Inc.
Milwaukee

C. E. NELSON
Technical Director, Magnesium Dept.
Dow Chemical Co., Midland, Mich.

of strategic materials conserved. More manufacturers will take advantage of powder metallurgy via the production of new models and parts. Aside from possible improved performance and savings, the factor of quickly getting into production is most attractive.

Mr. Rackley

We have a new manufacturing development which enabled us to announce recently the first complete line of tempered-and-ground flat steels in America. Through this continuous process, carefully-controlled, ground and polished carbon, alloy and stainless flat steels are available in large quantities in widths up to 24 inches. Such steels were formerly obtainable in quantity only in Europe; average delivery required at least 18 months.

We also expect to make gains in field of clad metals. Under our patented process we can build stainless-clad sections with fine corrosion resistance. Stainless analysis may be any reasonable standard and the percentage thickness may vary from 10 to 50 per cent.

We are planning for further applications of our Cost-to-Shape Tool Steels which are gaining greater usage every day.

Mr. Brown

Metallurgy has made possible commercial production of high temperature alloys. Quality and properties of these alloys are such that millions of pounds are being used in jet and gas turbine engines. It seems a good bet that within five years we will see the development of a successful gas turbine engine for automobiles. This will pyramid use of high temperature materials.

With that goal so near attainment metallurgists are now tackling the still more formidable problems associated with rockets and nuclear energy. These applications will require exceptional resistance to heat and corrosion. It appears that metals alone will not do this job, so a great deal of work is being done on cermets—mixtures of metals and ceramics. Some of these mixtures have shown good strength at high temperatures and good resistance to reaction with other metals.

However, two enemies at present plague them: 1. They oxidize rapidly if exposed to air at high temperatures; and 2. they are brittle. Some solution to these problems must be found. Since nuclear power for prime movers will probably be available in three or four years, metallurgists are confronted with a very vital material problem.

Mr. Klement

With release of government controls over quantity and application of nonferrous metals, there is increased activity in developing commercial applications for new alloys. These include high strength nonmagnetic alloys, nickel bearing aluminum bronze for marine work, manganese alloys with high dampening characteristics for noise abatement, better wrought bronzes for corrosion resistance and others.

Today, metallurgists are more aware of necessity to control some of the so called unusual properties of these new and also old alloys. Properties such as tensile strength, yield strength, hardness, and so on, are just as important as always. However, new engineering demands have caused more concern with control of the less usual characteristics, such as high and low temperature properties, electrical and thermal conductivity, weight-strength ratios and micro soundness.

As a point of illustration, control of electrical conductivity always has been a problem in our laboratories because of cumbersome methods required for nondestructive testing of various actual production parts. A recent German-made conductivity tester eliminates this problem entirely by use of a calibrated electronic unit with a spot contact which reads per cent electrical conductivity directly.

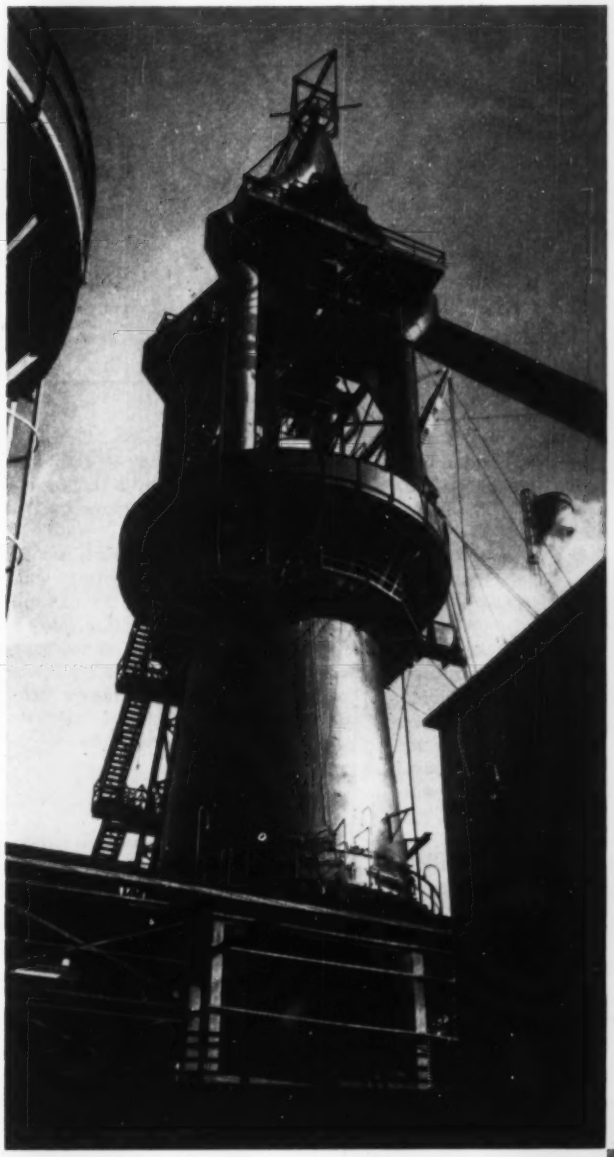
Mr. Nelson

Ample supplies of magnesium will be available in coming year from private production capacity and that of the operating government owned plants. Total production of primary magnesium in 1954 is expected to be about 75,000 tons.

In mill products, new capacity just going into production will provide an abundance of sheet, plate and extrusions. New mills will produce wider, high quality sheet and plate at considerably lower prices for some grades. Availability and lower cost of magnesium sheet is expected to stimulate activity among smaller fabricators and will bring about the entry of magnesium into more competitive products.

Breakdown unit for first high speed, high production rolling mill for magnesium is now in operation. Additional units for the production of thin gage sheet are expected to be in operation early in 1954. Along with this increased sheet capacity, new and improved extrusion presses are being installed to make larger, longer and higher property extruded sections.

Development of new high temperature magnesium alloys containing thorium is expected to increase usable range for magnesium castings on jet engines. They provide better creep resistance and more favorable proper-



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Titanium Alloy Mfg. Division
National Lead Co., Niagara Falls, N. Y.

DAVID I. DILWORTH, JR.
Director of Metallurgy, Crucible
Steel Co. of America, Pittsburgh

ties than previous alloys at temperatures in range of 500 to 700° F.

Improved methods of decreasing galvanic corrosion between magnesium and dissimilar metals with tapes and paints such as vinyls have been discovered. These, along with the development of new paints and primers which provide excellent corrosion resistance, are broadening the usage of magnesium in many applications.

Mr. Townsend

Conquest of space by airplanes and rockets and high speed projection of objects through the atmosphere result in the need for structural materials that will withstand tremendous ranges of thermal shock. This requires that empirical data be obtained concerning resistance of materials to extremely high and low temperatures on a time basis.

Materials and structures are being increasingly subjected to tremendous ranges of temperature with superimposed vibration and shock. It appears that we are at a new crossroad in technical development and we will need to have information concerning high and low temperature characteristics of materials. Data need to be collected concerning the physical properties of materials undergoing thermal shock for various periods of time.

Mr. Brennan

Aluminum industry has lost none of the vitality displayed during the past 13 years. Rather it has laid the foundation for continuing expansion. During periods of metal shortage, research activity of the aluminum companies was directed at finding alloys for specific uses in contrast to a policy of adapting products to a handful of alloys.

Future aluminum expansion will be into those fields of greatest usefulness. In following this course aluminum has placed no real limitations upon itself as the fields of greatest usefulness are those of tremendous potential. Construction and transportation, electricity and communications, machinery and equipment—the large material consumers—lie largely in the temperature-strength-weight range of aluminum's most efficient performance. In each of these fields, alloy development has been aimed at producing the ideal material for a specific set of conditions of application.

Although strength has inched forward and higher temperature alloys have appeared, the truly significant developments have been in midground where fullest advantages of the metal are experienced.

Mr. Hilkert

Direct substitution of a zirconium part for one of another metal will rarely accomplish the greatest economy, even though the use of the somewhat costly zirconium can frequently be amply justified on the basis of increased life and reduced down-times of production units. As familiarity with zirconium becomes more widespread, it is apparent that even greater economies may be effected by reconsideration of the design of units already operating but produced from other materials.

There is no one single formula that may be applied in considering redesign. For example, if a particular unit is using a heavy gage sheet purely to accommodate a moderate corrosion rate over an economical period of years, it may be possible to reduce this gage appreciably where the corrosion rate of zirconium is vastly superior. This change may be simply substitution of a thin-walled for a heavy-walled tube, or it may entail use of a lining of thin gage zirconium supported by a thicker wall of some inexpensive engineering materials.

Certain complexities, such as nonmetallic linings or gasketing which have evolved in a design, for example, to minimize galvanic action, may be found to be completely unnecessary. Co-operative design consideration by user and producer engineers offers a convenient method of achieving greatest potential economies.

Mr. Dilworth

The past can be observed with a great deal of satisfaction with regard to developments in all phases of materials and metallurgy. Many of these developments represent unusual and extensive variations and improvements from past practices. Continuous casting of steel, cold extrusion of steel, development of titanium and titanium alloys, commercial application of electronics, construction of unusually large precision machinery and equipment and development of special materials for severe service application are a few of the advances.

We feel certain that further refinements of many of these developments, as well as equivalent or greater accomplishments, are foreseeable in the near future. Materials for increasingly higher temperature applications will be developed. Materials with improved corrosion resistance for severe service will be discovered. New and improved tool steels will become available for increasingly severe service conditions that are constantly required. There will be improvements in the process of hot and cold extrusion of steels.

Steels will be designed for high strength service with a minimum of strategic alloy content. Progress in production and commercial applica-

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When ALLOYMET 2115 is used in the melt, the analysis of the finished product is never in doubt. Compare this with a heat of 18-8 scrap . . . but no, there is no comparison. Scrap — no matter how good it may be—is still an imperfect commodity that is generated; not made to order. ALLOYMET 2115, on the other hand, is a master alloy made to rigid specifications under the supervision of trained metallurgists who know the needs of the steel industry.

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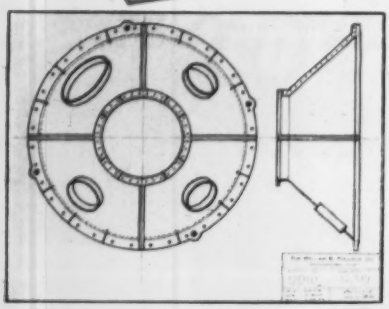

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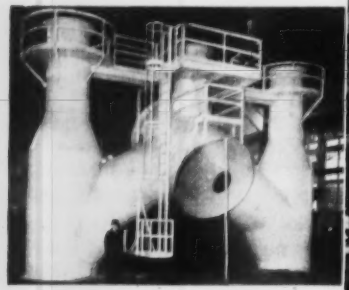
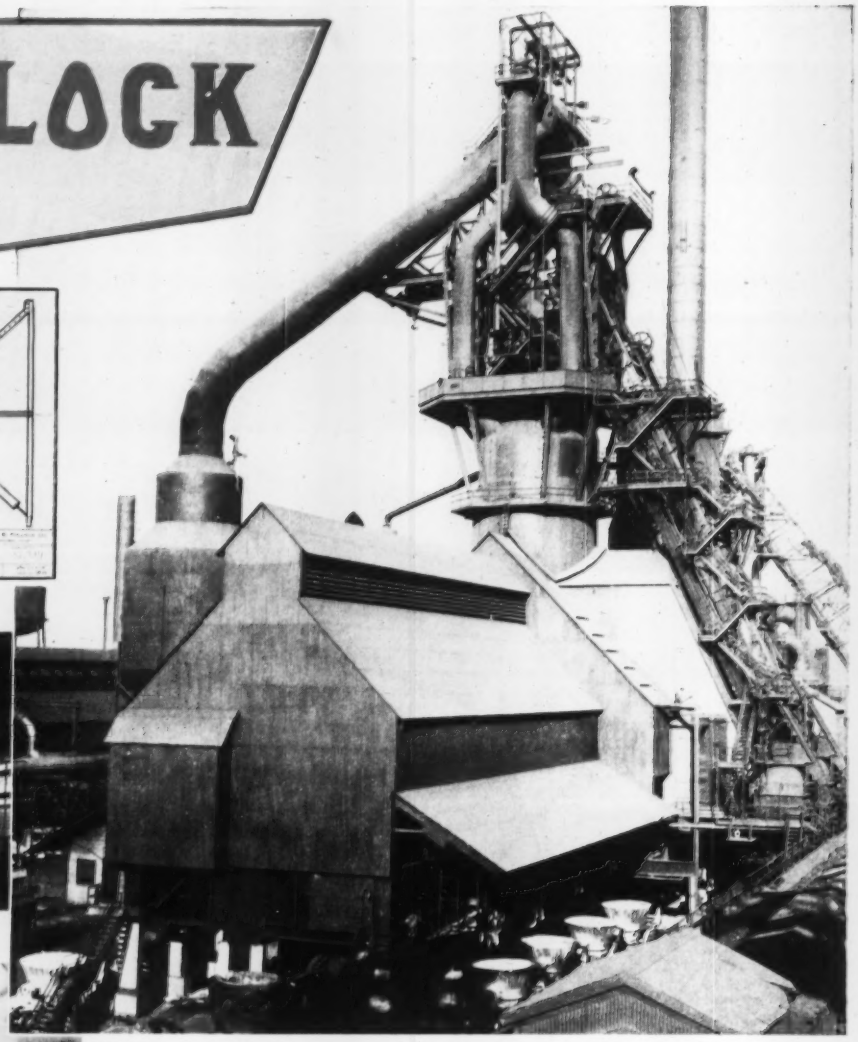


SHOP FABRICATION

FIELD ERECTION



Correlating the skills of Pollock engineering, fabrication and field erection to specific operational requirements of The Youngstown Sheet & Tube Company are evidenced in this blast furnace. In addition to furnishing the steel work for this blast furnace, Pollock designed and built auxiliary equipment, including the hot metal ladle cars and cinder cars shown in the above picture. The experience which the Pollock Company has gathered in over eighty-five years is available to you in planning your new projects.

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Chief, Magnetics Division, U. S. Naval
Ordnance Laboratory, Silver Springs, Md.

G. V. LUERSSEN
Vice President
Carpenter Steel Co., Reading, Pa.

J. R. WILLARD
Sales Engineering & Development Div.
Aluminum Co. of America
New Kensington, Pa.

tions of titanium and titanium alloys can be expected. There will be an expanded use of metals for exterior and interior architectural applications. A wider use of the principles of electronics and nuclear physics will be apparent in the field of metals and metallurgy.

Mr. Rodgers

Principle of application of extended surfaces to heat transfer problems is well established. However, due to continued research and development, fin tube surface, particularly of integral type construction, has invaded not only the processing industries but also normal everyday heating of water.

Integral finned tube of 19 fins per inch was developed primarily for the air conditioning industry for condensing refrigerants in water cooled shell and tube condensers. Fins are spirally extruded from thick wall tube, producing smooth fins with no sharp angles or crevices. Ends of the tubes are so designed that diameter of the plain end is slightly larger than diameter over the fins which allows the tube to be inserted into a tube bundle and rolled into a tube sheet similar to that of a plain tube.

Advantages are many: Having 2½ to 3 times the surface area of a plain tube, smaller bundles can be used; for the same shell diameter, a greatly increased capacity is obtained. When it is realized that heat transfer capacity of processing or refinery units is often the bottleneck, this becomes an important factor in design.

Mr. Lufcy

Production of high quality magnetic materials, to meet increasing demand for such alloys in manufacture of magnetic amplifiers, special audio and pulse transformers and magnetic decision elements, has continued to improve at an encouraging rate during the past year. Recognition by manufacturers of necessity for careful quality control over fabrication and heat treatment has resulted in definite improvement of quality and uniformity of materials.

Research and development programs directed toward new and improved magnetic alloys have resulted in several which show promise from standpoint of improved magnetic properties as well as reduction in use of critical and expensive alloying elements such as cobalt and nickel. An example: Successful fabrication, in cold rolled sheet form, of high aluminum content aluminum-iron alloys.

In permanent magnet field, announcement of several new, high coercive, high energy product magnets suitable for use as television focusing units and loud speaker magnets, is an encouraging sign of developmental effort being expended in this direction.

Mr. Luerssen

One of the interesting developments taking place in the metallurgical field has to do with men rather than material. It comes about through the manner in which our fast growing technology is geared to the development of alloys and particularly to alloy steels. Fields in which these steels take a vital part are many and varied, and now include a wide variety of electrical equipment, instruments, chemical equipment, high temperature apparatus, and tools, to mention a few. Successful development and application of these special steels make necessary a close understanding between the maker and consumer.

While most special alloy steel manufacturers have rather complete literature to set the groundwork for any one application, this is not always sufficient. It is often necessary to have personal interviews between technical people representing supplier and user. To make such discussions effective the steel maker must have knowledge not only of the technology of the materials involved, but the technology of his customer's product as well.

To meet this situation, there is growing up in the specialty steel business an increased number of scientific and engineering personnel who understand not only the language of steel making, but also the language of the specialized field in which their product is applied, whether it be electrical, corrosion, high temperature, or what not. While high quality materials are a paramount requirement, a good part of success depends upon their intelligent application.

Mr. Willard

Past year was one of major growth in aluminum markets. Perhaps the most dramatic stimulus is typified by the architectural field—completion of Alcoa home office building in Pittsburgh and Tishman Building in New York City is to be followed soon by construction of a known total of 54 aluminum skinned buildings in progress or on the drawing board.

Transportation field is of continuing importance as a user of aluminum. In electrical field, aluminum continues its dominance of high voltage transmission. Also, use in the distribution and service power line fields and for bus bar is broadening. For industrial wiring and for applications in motor and transformer windings and switch gear, there is opportunity for increased aluminum.

Process industries' applications of aluminum are increasing in importance. Such advances as the inclusion of five aluminum alloys in the ASME

Tooled up to help industry build

Two new bessemer converters are another example of Great Lakes Steel's readiness and ability to serve its customers in 1954.

Their job is to refine molten pig iron for the open hearth furnaces Great Lakes uses to make fine steel. This new installation doubles the capacity of the plant's bessemer facilities and contributes importantly to efficiency and quality in steel-making.

Big in themselves, these 25-foot high bessemers are only a small part of the major "tooling-up" we've been doing at Great Lakes Steel. A new blast furnace, a new slab mill, new coke ovens—all are part of a program which now assures automotive and other manufacturers of more high-quality flat-rolled steel. All together, our enlarged and balanced facilities give us an annual capacity of *four million ingot tons.* And that's good because Great Lakes Steel was set up in the first place to provide industry in its area with a *dependable first source* of sheet, strip, and other shapes used here in vast volume. We've become that source largely because of our *integration* as a steelmaker. We start right with the ore, and work it through blast furnaces, bessemers, open hearths, blooming mills, hot and cold rolling mills and merchant mills, down to the finished forms. That gives Great Lakes flexibility that lets us do a real job.

Look for more great things from Great Lakes Steel—the nation's foremost specialist in flat-rolled products. We aim to serve well our customers in many fields . . . while we keep pace with the automotive industry's mammoth needs. *Great Lakes Steel Corporation, Detroit 29, Michigan.*

Offices also in Chicago, Cleveland, Grand Rapids, Lansing, New York, Philadelphia, St. Louis and Toledo.

Great Lakes Steel

NATIONAL STEEL CORPORATION

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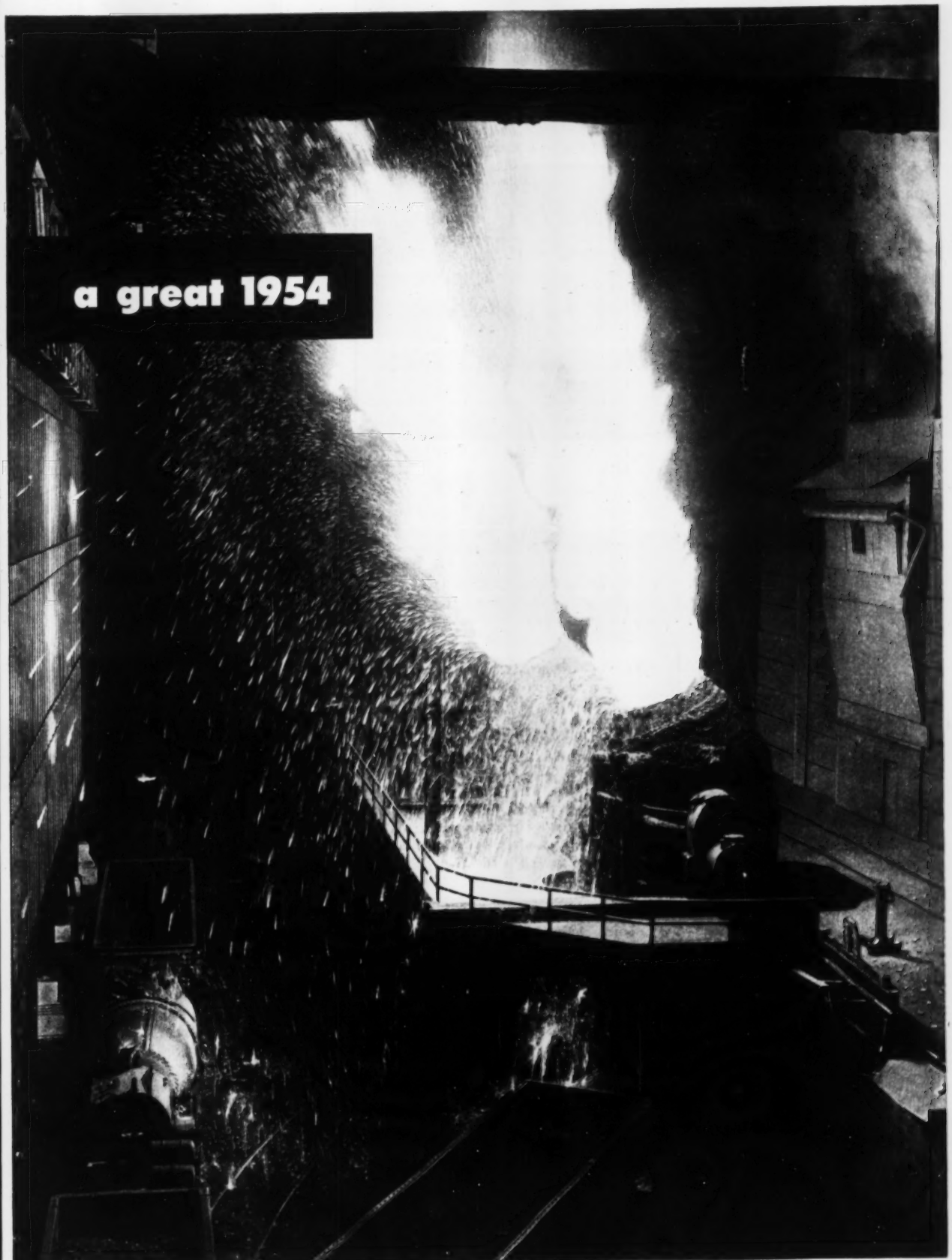

Illustration: Bessemer converters, Great Lakes Steel.

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FRED L. PLUMMER
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Hammond Iron Works, Warren, Pa.

GEORGE R. CASKEY
Chief Metallurgist
Bliss & Laughlin, Inc., Harvey, Ill.

Boiler and Pressure Vessel Code signify aluminum's increased importance to such basic process industries as petroleum and chemicals.

Broader production facilities, better alloys and the extension of older markets, as well as acceptance of aluminum in some of the new markets now in the try-out stage, give a promising picture for the industry in 1951.

Mr. Hardy

Outstanding development of adding lead to steel should bring about many changes in carbon and alloy steels for the future.

Lead, long used to enhance machinability in nonferrous materials, is now performing a similar function in steel. Machinability is increased as much as 50 per cent and tool life correspondingly enhanced through use of leaded steels. Important, too, is that physical and mechanical properties or hardenability are not affected by addition of lead to standard steels.

With economy of production being a most important objective in the manufacture of any product today—faster machining rate, and longer tool life, obtained through the use of leaded steels—add up to greater productivity at lower final cost.

Mr. Browall

Addition of lead, in a range of approximately 0.15 to 0.35 per cent, to any basic steel analysis, carbon or alloy, increases machinability a minimum of 25 per cent over that of the analysis without lead. Problems of uniform distribution and methods of analysis and testing encountered in the early stages have been eliminated or minimized so that today a uniform, reproducible material is available.

Use of leaded steels is dependent upon a number of economic factors. Addition of lead to steel in sufficient quantity and properly distributed, has shown no adverse effects on the inherent properties of the basic steel, nor any beneficial effect, except to appreciably improve machinability. Some of the points to consider are: 1. Can the machines develop higher speeds and/or feeds? 2. Is tool life a problem? 3. Are added phosphorus and sulfur detrimental to end product? Leaded steels or normal phosphorus and sulfur give machinability without the detrimental effects of the added phosphorus and sulfur. 4. I p[illegible]t hot or cold forged or extruded prior to machining operations, which present problems in high phosphorous and high sulfur steels?

Five grades of leaded steels are currently available. As production facilities are increased and demand for other grades in economic qualities arise, provision will be made to expand the available grades of these steels.

Mr. Plummer

Three significant trends may be noted in connection with the construction of large, field-erected, welded steel storage and process vessels. Whereas steels conforming to ASTM A-283 and A-285 specifications were generally used without restrictions in the past, some customers are now requiring that plates 7/8-inches or more in thickness consist of steel made with fine grain practice and with limits on carbon and manganese content; thus attempting to secure vessels with better low temperature strength properties.

In field assembly of large, thick-walled vessels, erectors are using twin automatic welding heads in completing butt welding of horizontal girth seams. One fabricating firm has announced development of similar equipment which can be used for automatic welding of vertical butt joints in shells of cylindrical tanks.

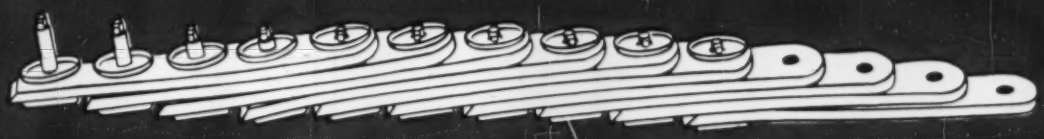
Use of portable x-ray equipment for inspection of welded joints in field erected vessels, is growing rapidly. Preliminary approval has just been voted by API Committee 12-C for use of spot x-raying as alternate to trepanning in inspection of welded joints of oil storage tanks.

Mr. Caskey

Production by acid bessemer process of bessemer, sulphurized, screw stock steels, which for years have set the standard for high machinablity, was virtually discontinued with announcement by two of the largest steel producers that they would no longer produce sulphurized steels in bessemer converter. This, following similar action by other large producers within the past year or so, practically marks the passing of bessemer-made screw stock from its traditionally high position. This action was taken only after many years of research and experimentation to develop an open hearth equivalent of equal or superior machinability, soundness and surface quality.

Almost simultaneously with introduction of open hearth made bessemer equivalent steels, came a new Ledloy steel grade, also made to basic open hearth practice. With

This detailed line drawing of the new, patented Veelos TD and TE v-belt makes it easy to see how this new v-belt is designed to do a better job . . . easier!



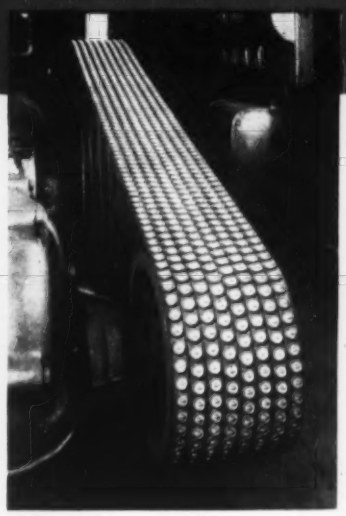
Link is beveled for extreme flexibility.

T-screw is made for strength and for easy coupling and uncoupling.

Cup-washer is shaped to resist belt wear.

Stud is anchored permanently in the link for added durability.

Individual link is designed for greater strength.



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It simplifies installation. Links are quickly joined by easy-to-use cup-washers and T-screws to make up individual belts. It's the easiest v-belt to couple and uncouple ever developed. And you don't need to waste time removing outboard bearings.

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N. S. MOTT
Chief Chemist & Metallurgist
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a chemical composition differing slightly from that of B-1113 bessemer, but with addition of lead, Ledloy Grade A, which is a carbon steel, develops machinability substantially superior to that of the old B-1113 bessemer screw stock, which was once considered the most free cutting type of steel produced.

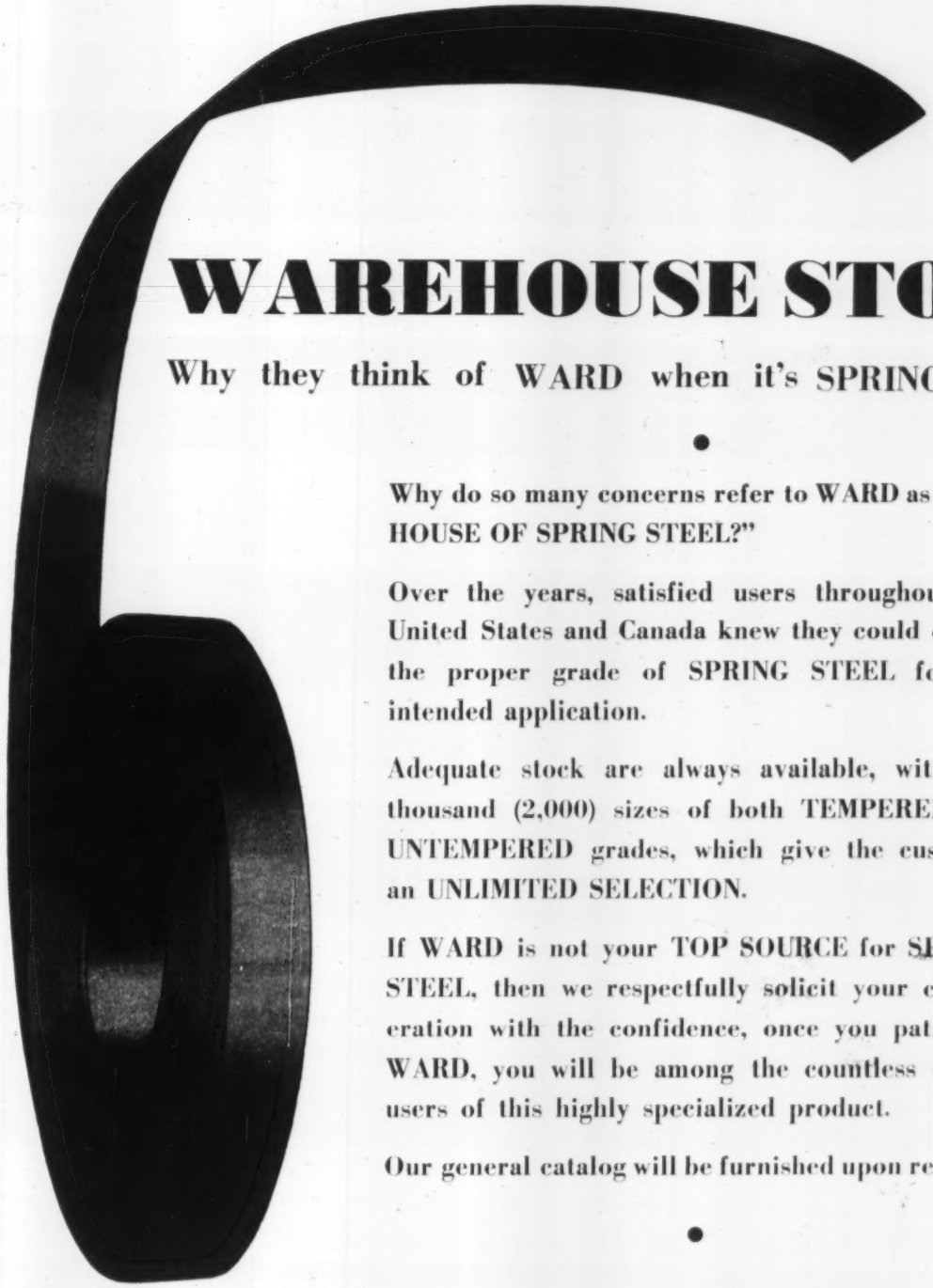
Ledloy also is now being produced in several grades of alloy steel. Analyses are identical to those of standard grades, except that lead is added, which improves machinability, without change in physical properties or heat treating possibilities. These Ledloy grades can be made in either open hearth or electric furnaces.

Mr. Mott

Current trend in cast stainless alloys is toward increased use of highly corrosion resistant cast FA-20 (20 Cr, 28 Ni, 3.5 Cu, 3 Mo) alloy type. This indicates that demands of industry are becoming more and more severe. A new alloy, Hastelloy F (20 Cr, 45 Ni, 6 Mo + Cb), has been developed to cover the field intermediate in corrosion resistance and price between FA-20 and the expensive, high molybdenum Hastelloy A, B and C and Chlorimet 2 and 3 types.

Galling in stainless steel is severe and has long been a major problem in the stainless industry. It almost eliminated use of the practical plug valve, and also greatly limited use of the solid wedge, disc valve in stainless 18-8 compositions. A possible solution to this problem is the new alloy, V2B, a nongalling 18-8 type stainless possessing high hardness and corrosion resistance.

Substituting type 321, (18-8 titanium alloy) for scarce columbium bearing type 347 has not been too



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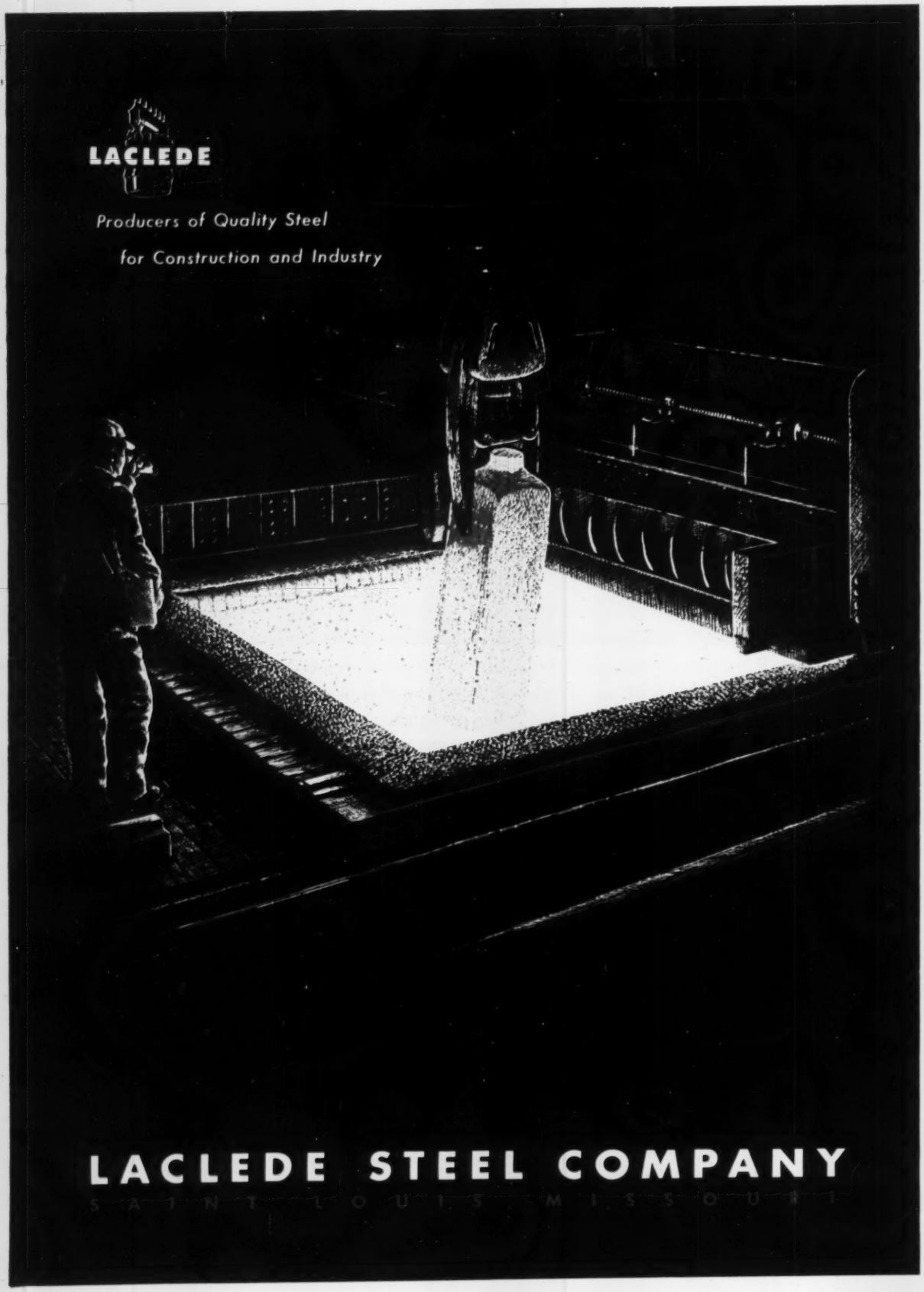
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Metallurgical Engineer
Molybdenum Corp. of America, Pittsburgh

WALTER L. FINLAY
Research Manager, Rem-Cru Titanium Inc.
Midland, Pa.

successful in the casting field. Tendency is to use lower carbon ELC (<.04 C) 18-8 grades.

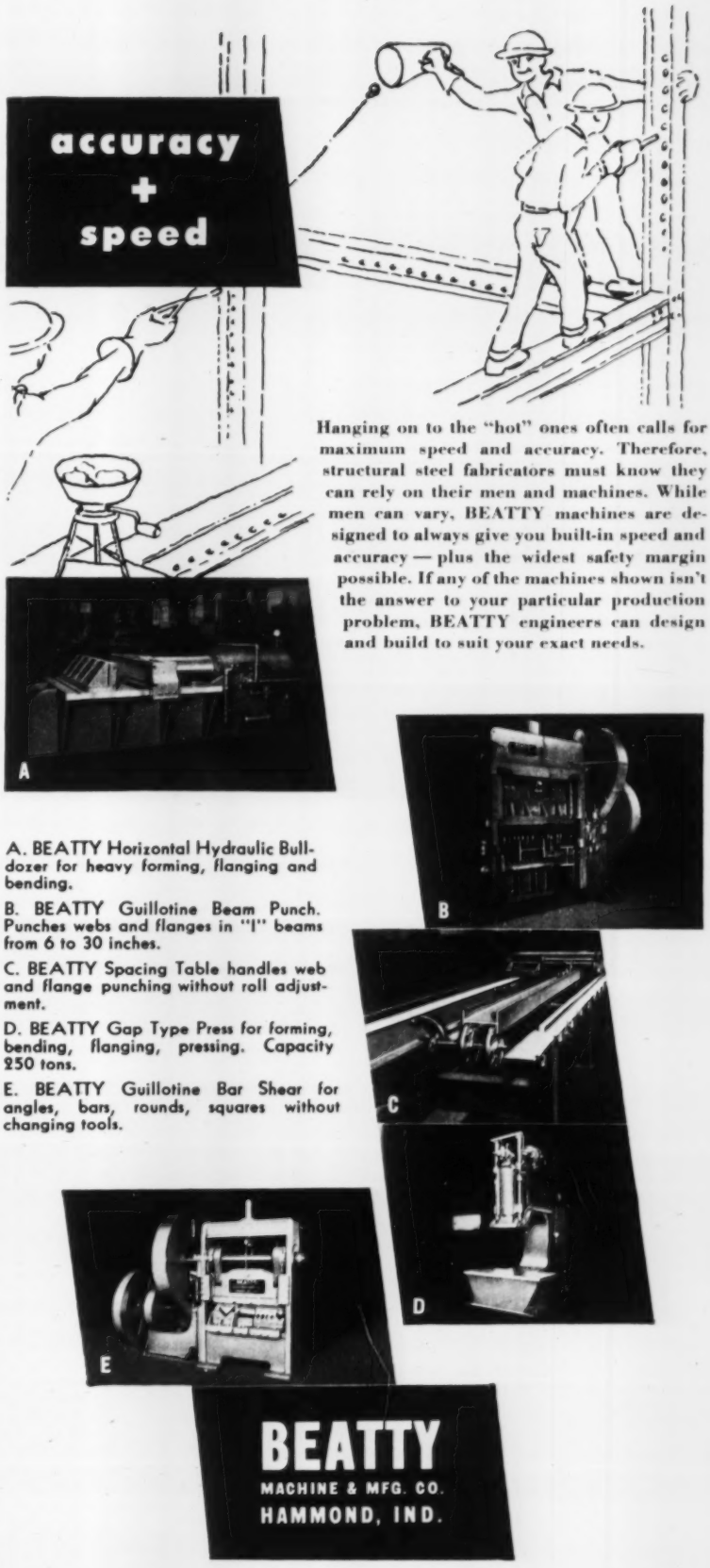
Mr. Tisdale

New uses of rare earths are continually being made and others are contemplated. They increase hot workability of steels, making it possible to roll some that formerly were unrollable and ease the problem on difficult rolling stock. Some treated grades of stainless steel show better anti-corrosion properties due to fine grain size of primary crystallization.

Physical properties of nodular iron are made more dependable by incorporating a small amount of rare earths. Some welding rod coatings seem to perform better by incorporating rare earths. Rare earths develop special properties in alloy grades which are valuable when low temperature shock resistance is required. Present development work indicates many new uses for this new material.

Mr. Finlay

Titanium uses and production continued to soar in 1953. First industrial production in 1948 was 2½ tons. In 1952 it was 700-plus tons and when official figures are totaled up for



Hanging on to the "hot" ones often calls for maximum speed and accuracy. Therefore, structural steel fabricators must know they can rely on their men and machines. While men can vary, BEATTY machines are designed to always give you built-in speed and accuracy — plus the widest safety margin possible. If any of the machines shown isn't the answer to your particular production problem, BEATTY engineers can design and build to suit your exact needs.

A. BEATTY Horizontal Hydraulic Bulldozer for heavy forming, flanging and bending.

B. BEATTY Guillotine Beam Punch. Punches webs and flanges in "I" beams from 6 to 30 inches.

C. BEATTY Spacing Table handles web and flange punching without roll adjustment.

D. BEATTY Gap Type Press for forming, bending, flanging, pressing. Capacity 250 tons.

E. BEATTY Guillotine Bar Shear for angles, bars, rounds, squares without changing tools.

HENRY C. BOYNTON
Consulting Metallurgist
Temple University, Philadelphia

J. H. JACKSON
Manager, Metallurgy
Battelle Memorial Institute, Columbus, O.

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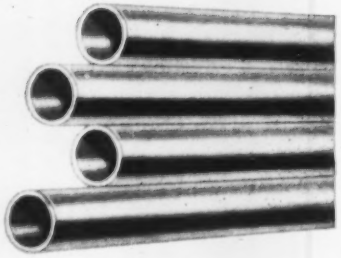
Globe seamless carbon steel tubes are furnished to standard specifications in low and medium carbon ranges.

When you specify Globe you are sure of uniform high quality carbon steel tubes. That's because they are the product of highly developed production facilities and specialized quality controls and methods.

Globe engineers are at your service to assist in the selection of tubing of the exact characteristics you require.



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Producers of Globe seamless stainless steel — Gloweld welded stainless steel tubes — alloy-carbon seamless steel tubes — Globeiron (high purity ingot-iron) seamless tubes — Globe precision-process welding fittings.

1953 the figure will surely be more than double the previous year.

Behind these statistics is the fact that in 1953 several titanium aircraft parts moved from prototype to routine production stage. These included Douglas' most advanced commercial transport, the DC-7, the North American's famed fighter, the Sabre Jet. Coming along are the world's speed record holder, the F-100, and compressor stages of the more advanced jet engines.

Aiding this trend toward full fledged production status, we pioneered the first 9000-pound continuous wide strip coil and introduced a new alloy, A-110AT, outstanding for weldability, toughness and hot strength.

☑ Mr. Boynton

Radioactive isotopes of many of the common metals are becoming most active tools of the modern metallurgist. When the nucleus of a metal atom is bombarded with the right "bullet," it may be enlarged or decreased and leave another new element or an isotope that may or may not be radioactive. If radioactive, it will emit radiant energy in the form of alpha, beta or gamma rays and it is these "hot" isotopes that are useful to metals men.

Radioactive isotopes may be mixed with their stable isotopes and will act as tracers or tagged atoms; such active atoms are used in autoradiography, chemical analysis (trace elements), in gaging the thickness of strip metal, rubber, plastic and paper, or in estimating wear on pistons, locating hidden leaks in oil or water pipe lines, and controlling the height of liquids in tanks. Co^{60}, Fe^{59}, Cr^{51}, C^{14}, Sr^{90}, I^{13} are some radioactive isotopes being used.

☑ Mr. Jackson

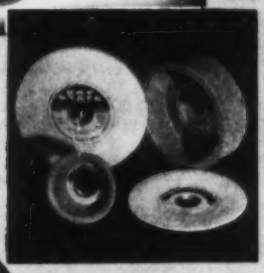
There has been little change during 1953 in the need for better materials for aircraft. Jet engine development has been limited by availability and properties of present high temperature materials. One potential bright spot has been the announcement of a new nickel base alloy, GMR235, which can be cast in the form of turbine buckets. Other new, forgeable, high-temperature alloys include the British Nimonic 100, which is a molybdenum-modified Nimonic 95, and a new modification of Inconel "X". Maximum operating temperatures for these alloys approach 1600° F.

Titanium carbide base cermets are

FOR WELD GRINDING

FOR TOOL MAINTENANCE

FOR ROUGH GRINDING



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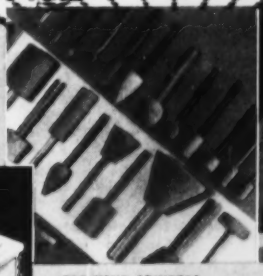
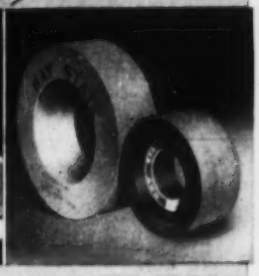
WHEELS of PROGRESS





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PAUL W. PHENEGER
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receiving attention but problems of brittleness have not been solved adequately. Molybdenum base alloys are still over the horizon because adequate protection against high temperature oxidation is still an unsolved problem. Chromium base alloys look promising, although real development of these alloys is in initial stages and their shortcomings are yet to be determined.

Greatest titanium headache today is quantity production. Titanium production capacity is being steadily increased, but it will be some time before the metal becomes generally available.

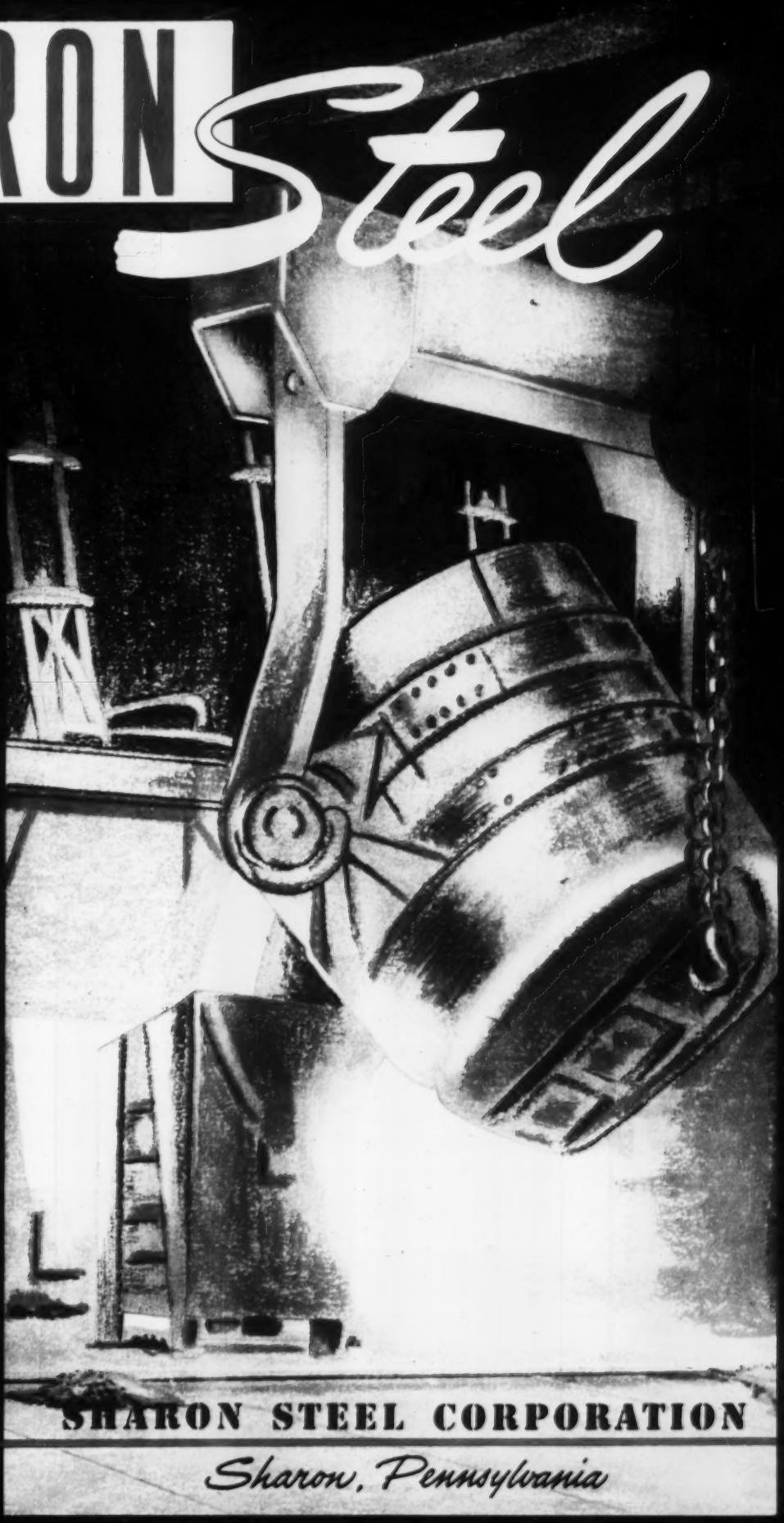
Remarkable progress is being made in the development of molding materials for titanium casting. Surface finish and surface contamination problems seem to be entirely eliminated by a new experimental shell mold material.

Mr. Pheneger

Today, philosophy regarding use of clad metal is changing. To be sure, clad metal still can serve as an excellent economic substitute and unquestionably its use will continue to grow in the many fields where savings can be realized as compared to the use of solid metals. However, it is finding more and more uses in addition to this by reason of its unique properties. A good example: Steel core clad on both sides with a corrosion resistant material. This affords the distinct advantage of strength of the steel core with the corrosion resistance of the cladding material, which may or may not be strong in its own right.

Another unique quality of clad metals is heat distribution properties of the interior core of stainless clad steel strip. Solid stainless does not give proper results in certain uses

SHARON Steel



PRODUCTS

Stainless Strip
Hot and Cold Rolled Strip
Galvanite* Strip
Cutlery Steel
Cold Rolled Spring Steel
Hot and Cold Rolled Alloy Strip Plates
Cooperage Hoop
Electrical Sheets
Deoxidized Sheets
Galvanite* Sheets
Galvanized Sheets
Long Terne Sheets
Enameling Sheets
Sheet Bar
Billets
Blooms
Slabs
Open Hearth Steels
Electric Furnace Steels
Cor - Ten
N. A. X.
Copper Bearing Steel

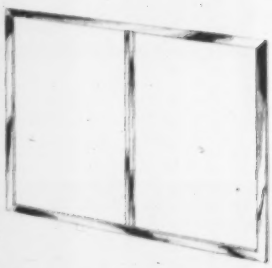
*Trade Name

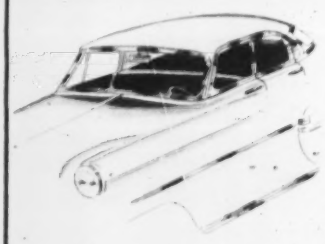
SHARON STEEL CORPORATION

Sharon, Pennsylvania

SHARONSTEEL

SHARONSTEEL Stainless Steels . . .





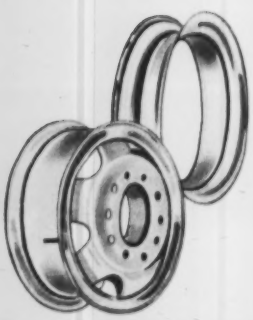
Bright, gleaming, rust-defying, electric furnace steels that are being used in ever increasing quantities in a wider variety of products than ever before.

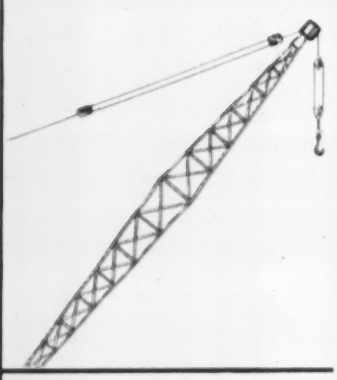
Sharon Stainless is especially noted for its superior finish — a high gloss, mirror surface that gives to products that rich, just-polished appearance that appeals to consumers.

Sharon Stainless steels are available in both the straight chromium and chrome-nickel grades. You'll find them of consistent quality, gauge and analysis uniformity.

*New Stainless Steel Booklet available by contacting any Sharon office.

SHARONSTEEL High Strength Low Alloy Steels . . .

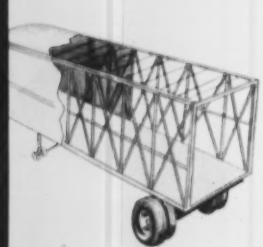


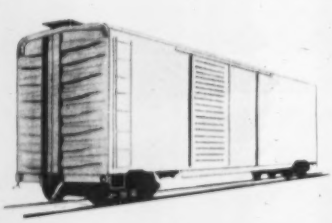


High strength-weight ratio steels that enable fabricators to build products of lighter weight without sacrificing strength.

These steels have definite rust and corrosion resistance and form with all the ease of plain carbon steels.

Sharon makes two of the more popular types of these high tensile steels — N.A.X. and Cor-Ten. Each of these steels has special qualities adaptable for specific use. Let Sharon know of your needs and our metallurgists and engineers will work with you in providing the steel to exactly suit your job requirements.





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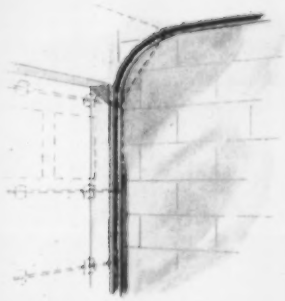
Coated Steels . . . SHARONSTEEL

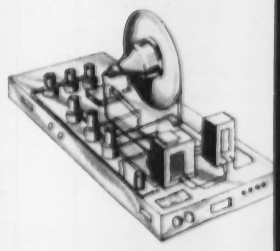
Sharon has a reputation for making coated steels of high quality. The more noted of these are:

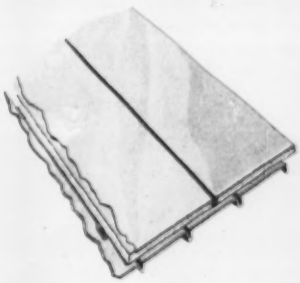
SHARON GALVANITE — a hot dip, wiped zinc-coated steel that fights rust and corrosion, presents an ideal surface for the application of paint where desired and fabricates with the ease of plain steels.

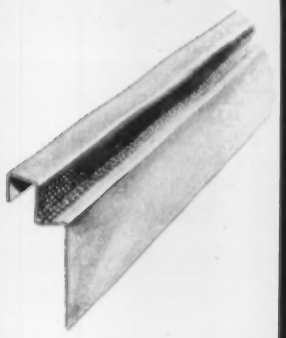
GALVANIZED — a spangled coated steel that has long been popular with fabricators who require a steel that must withstand normal atmospheric corrosion and everyday dampness.

TERNE — Sharon Terne is an alloy coated steel with excellent soldering and deep drawing qualities. Because of its ability to resist corrosion caused by petroleum it is widely used in the manufacture of gasoline tanks, filters, etc. It is also extensively used in the radio and electronics fields.









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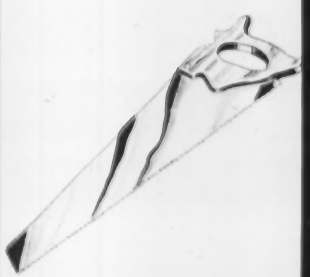
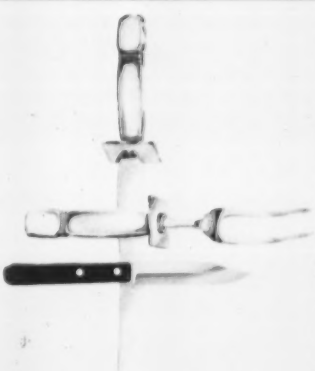
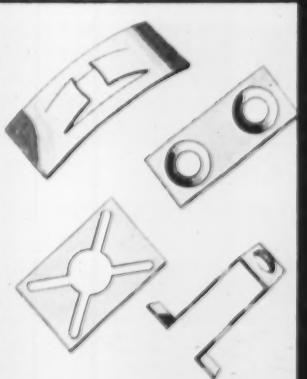
High Carbon Cold Rolled Steels . . . SHARONSTEEL

Where edge-holding and spring characteristics are required Sharon High Carbon Steels are recognized as some of the finest grades available. Sharon makes a full range of steels in this class for uniform high-speed blanking and forming production. These steels are used extensively by fabricators of saws, fasteners, clamps, shims, chain, etc. — wherever high fatigue resistance is a factor. Sharon metallurgists have worked with hundreds of fabricators in developing just the right analysis, heat treating and hardness ranges in these spring quality steels to exactly suit job requirements.

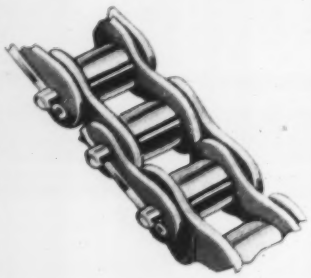


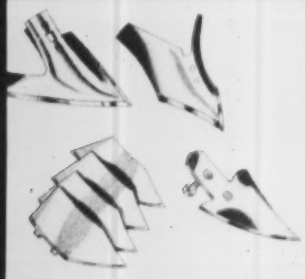


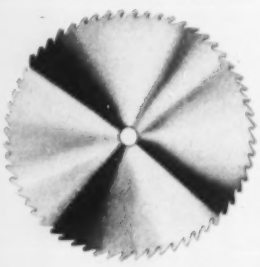


Strip Steels are available in any width selection in large diameter coils.

SHARONSTEEL Electric Furnace and Open Hearth Alloy Steels...



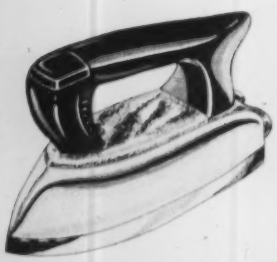


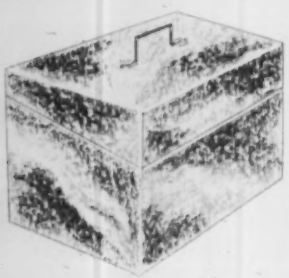


Whatever your need in alloy steel you'll find just the right analysis to suit your job requirements by contacting your Sharon representative. And once the alloy is determined you can depend on Sharon to deliver consistent high quality and uniformity every time.

Sharon electric furnace or open hearth varieties have gained the respect of fabricators wherever they are used. Sharon has long been a prime supplier of these steels and Sharon metallurgists have had long experience in working with manufacturers who use special alloy steels. The next time you need alloy steel, regardless of analysis, why not talk it over with the Sharon man in your area?

SHARONSTEEL Design Steels...





SHARONART — Since its introduction to the trade, SHARONART, Sharon's pattern surface steels, is finding cost-saving and styling applications in almost every metal consuming industry.

Where frequent design change is required, such as in the automotive, appliance, business machine, metal furniture, household equipment and cabinet hardware fields, SHARONART is ideal.

Actually SHARONART is a group of patterns which can be rolled into a steel surface. The user selects a pattern from a group of ready made designs, or works up his own design, and this is rolled into one or both sides of the steel. The advantages of such a steel are manifold. Complete appearance changes can be effected without making costly die alterations; by wiping, a two-toned paint effect can be achieved with a single color; it greatly reduces marking or scratches on a product. SHARONART is available in stainless, carbon or coated steels. Let the Sharon representative nearest you show you how SHARONART can save you thousands of dollars. Let him give you the full story of this amazing new idea in steel. Or write for your copy of the SHARONART booklet.

*SHARONART Booklet available by contacting any Sharon office.

W. L. BATTEN
Powder Metallurgy Department
Vanadium-Alloys Steel Co., Latrobe, Pa.

where good heat distribution is required. Clad metals have an advantage also in the electrical fields, where it is possible to attain satisfactory electrical characteristics and at same time achieve properties peculiar only to the core metal of clad steel strip.

Future of clad metals looks bright. New uses are certain to arise because of price reductions and because industrial designers are learning to contemplate its use as a matter of habit and adaptability. We feel that in the future, use of clad metals will reach a point where they are recognized as a significant steel industry statistic.

Mr. Batten

A relatively new application for porous stainless steel sheets is de-icer sections for critical aircraft control surfaces. De-icer sections made from type 316 stainless steel powder have worked well and the future is promising. Structural stainless steel powder applications include water meter parts, sleeve bearings for acid pumps, medallions of various types and many other small machine components.

Additional applications for prealloyed stainless steel powder are in communication and ordnance equipment. Rate of consumption is expected to continue to increase as more powder metallurgy fabricators add high temperature furnaces and reducing atmospheres required to sinter stainless powder and as more designers become aware of the corrosion resistance, high tensile strength and excellent ductility that is obtained with stainless steel powder parts.

In field of alloy structural steels, AISI4650 steel powder is helping powder metallurgy bridge the gap between low and medium strength iron powder parts.

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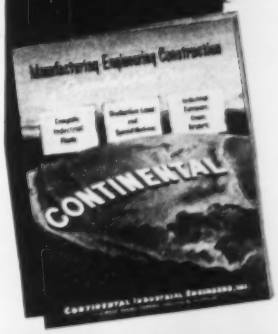

for military production . . .

Whatever your heat process problems in plant conversion for military production, CONTINENTAL has the answer.

CONTINENTAL jobs begin with analysis of the requirements, then the selection and development of proper methods for greatest results. Finally follows the design, the building, and installation of the equipment including necessary work-handling accessories and control devices—delivering a COMPLETE UNITIZED PRODUCING PACKAGE with results guaranteed.

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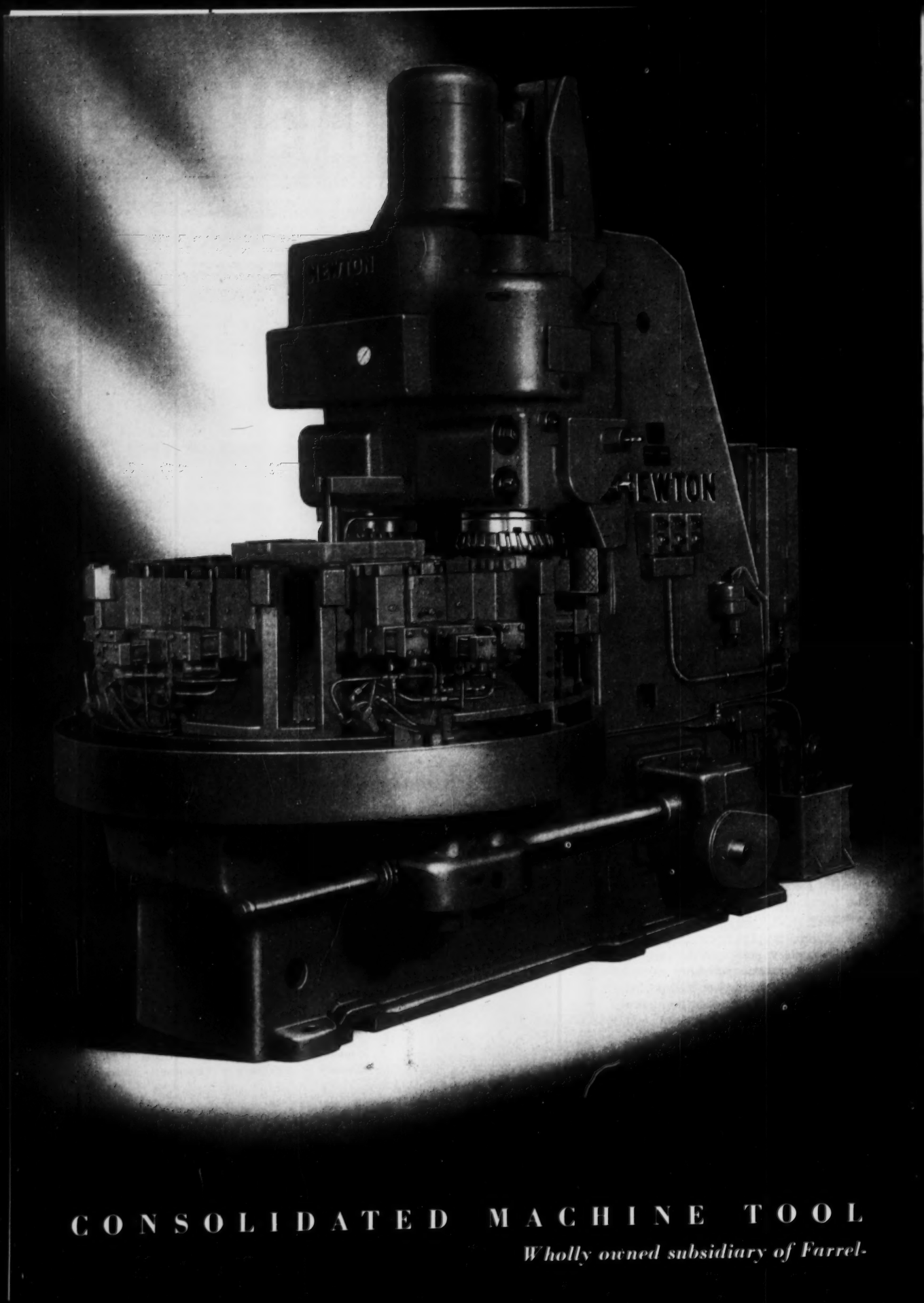

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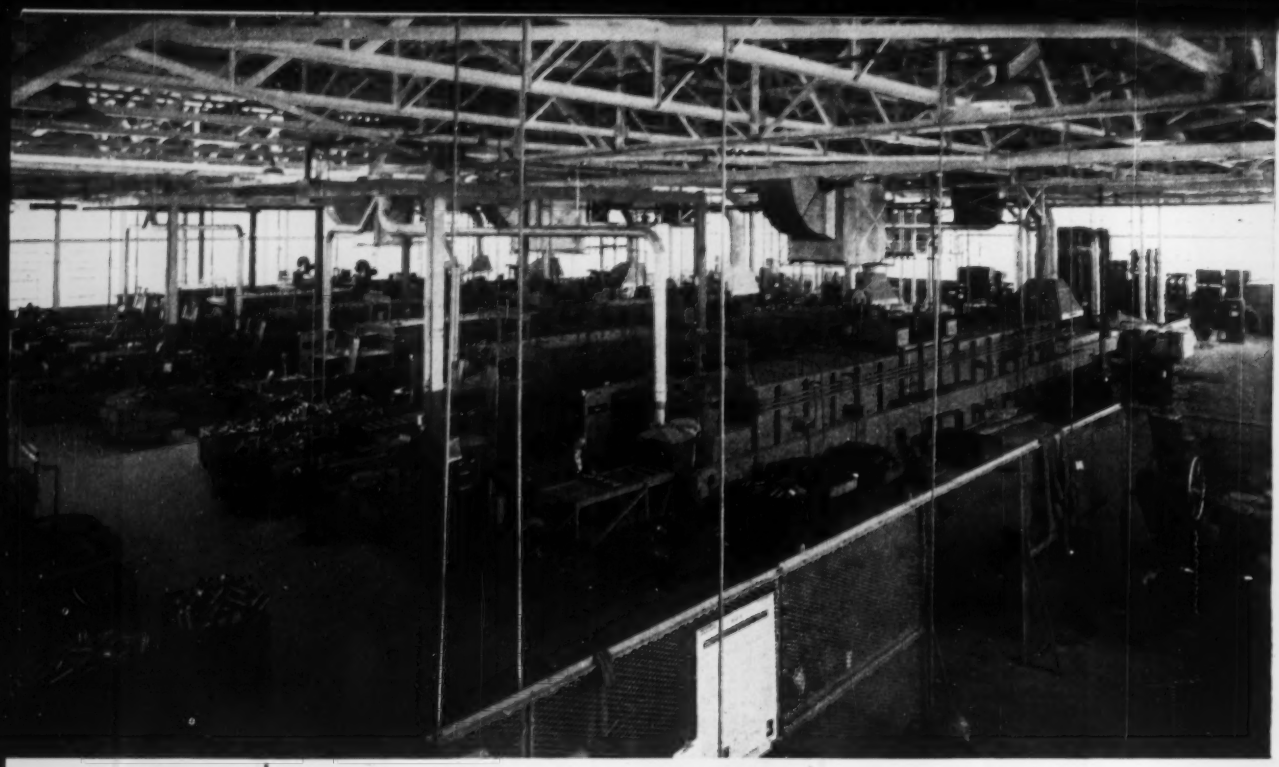

TECHNICAL PROGRESS

Heat Treating

ANTICIPATING the demands of a new era of competition, manufacturers are taking a critical look at their heat treating methods. Their object: Cost cutting and improved quality.

Many are surprised at what they see. Technology is coming up faster than most of them realize. New standards in accuracy of case depth, hardness and decarburization can be met. New facts are known about exact conditions needed to produce a given result.

Metallurgists are studying these closer controlled and specialized heat treatment methods in a trend toward leaner alloys and more carbon steel. Flame and induction hardening, with ingenious fixturing and scanning devices, may give a degree of selective hardening that permits use of carbon in place of alloy steels.

New heat treating equipment is more highly mechanized. Better design makes it more efficient, more effective, safer and easier to maintain and service. Salt bath installations, conveyorized to require only one operator, are used for carburizing, martempering, neutral hardening and annealing with clock-like precision. Automatic-controlled, atmosphere operations give bright, scale-free work, carburized or treated to exact specifications.

Boron steels are losing ground to standard grades. Some reasons for trend away from boron steels: Higher prices, excessive core hardness which distorts low carbon types on quenching, and variations from heat to heat.

Mr. Peters

Modern equipment has improved control and quality of heat treatment processes. Salt bath hardening is considerably enhanced by mechanization. Stable salts are available for all types of carburizing, hardening and tempering. Studies of water-bearing salt baths indicate a wide range of temperatures for austempering, marquenching and drawing.

Flame hardening permits rapid selective treatments. Multiple flame heads permit hardening of several parts simultaneously. Induction hardening has advanced in scope through continuous hardening and drawing of bar stock to dual frequency treatments of gears requiring close case contour control. Ingenious fixturing and scanning devices permit selective hardening and use of carbon in place of alloy steels.

In the carburizing field, economics dictate use of continuous equipment. Such units serve with special gas preparation devices are efficient and long lived. In recent years, batch type gas atmosphere furnaces have become popular. They have advantages of flexibility and control and permit carburizing, carbon restoration and clean hardening. With the addition of hot quenching and slow cooling facilities, this type of equipment is versatile and efficient.

Mr. Zurburg

Today there is no argument among heat treaters on the question of whether heat treating is a science or an art, for no heat treat operation can be performed efficiently without the use of today's systematized knowledge of the variables involved. It is through detailed studies of these heat treat factors that this science is being elevated to a much higher plane of refinement.

Carburizing serves as a typical illustration of efficient use of materials through detailed, systematic investigations. Laboratory tests established precisely the optimum carbon and hardness gradients that resulted in a marked improvement of fatigue and wear properties of a specific part for the desired material and heat treatment.

Application of these results to production led to statistical studies of atmospheres and their control. Accordingly, with proper and sufficient instrumentation, and with statistical quality control, the laboratory developments were applied to production to produce a high quality part at an actual cost reduction. The same story repeats itself for other processes and materials. Most pleasant part of picture is that such developments have just begun.

Mr. Strauchen

Fully or semi-automatic flame hardening units are being developed in increasing number to provide accurate, selective hardness patterns on large volumes of parts. This is particularly true where intricate and compact designs required for better weight-power ratios make it necessary to localize heat treatment on component parts.

On small lot production where unit costs are high, new developments indicate increased use of flame hardening. New design burners and new fuel control methods permit accurate flame hardening with low cost fuels such as natural gas and air. Low B.t.u. manufactured gas from city mains is also being used effectively in place of the more expensive fuels, such as acetylene and propane. Where a wide variety of dissimilar parts are hardened, heat treating shops will find a new flame hardening development to be of benefit. It makes it possible to operate several low cost, flexibly tooled hardening units from a single power source.

Flame hardening as a means of producing localized hardness is bringing about significant changes in material specifications and in the thinking of design engineers. It is no longer necessary to specify alloy steels to obtain maximum hardness on the surface of large parts. Equal results are achieved using the cheaper grades of plain carbon steel.

Mr. Osborne

Immediate future of induction heating has never looked brighter than it does today. First, it is quite apparent that American industry is on the threshold of a major cost reduction campaign, and induction heating is, above all else, a cost reduction tool. Almost every installation made is on the basis of doing a job better and at lower unit cost than possible by other heat treating methods.

A second optimistic factor is the widening of induction heating applications due to increased consciousness of its merits by the metalworking industry and more imaginative engineering by induction heating equipment manufacturers. Example of this is the recent addition of in-

R. J. PETERS
Chief Metallurgist, Warner Gear Div.
Borg-Warner Corp., Muncie, Ind.

HENRY M. ZURBURG
Head, Metallurgical Dept.
Chrysler Corp., Detroit

DAVID STRAUCHEN
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H. B. OSBORNE, JR.
Technical Director
Ohio Crankshaft Co., Cleveland

DO YOU KNOW WHAT HEAT TREATING COSTS
When You Do Your Own?

If you now do your own heat treating—or are contemplating the installation of a heat treating department—have you carefully considered all of the costs involved? Each of the following factors must be given careful consideration:

LABOR

Trained operators require years of experience, without them you cannot expect satisfactory heat treating. Can you afford men of this caliber for the amount of heat treating you require?

MAINTENANCE

Equipment must be kept in constant repair to prevent rapid deterioration. What does it cost you or what will it cost you?

SUPPLIES

Gas, electricity, chemicals—an endless variety of materials are needed continually. Are you wasting money due to insufficient work to keep all equipment going? Closing down and re-heating furnaces is an expensive waste.

TESTING EQUIPMENT

A constant check on heat treating operations and results is required to maintain quality and uniformity. Add this to the cost of your equipment along with skilled operators.

PLANT SPACE

Does your present department have enough space to work efficiently? If planning a new department, will it require an addition to your plant?

INSURANCE

What has the installation of a heat treating department done to your insurance rates? What can you expect if you are planning a new department?

EQUIPMENT

Can you economically install sufficient equipment to handle all of your requirements for hardening, annealing, carburizing, nitriding, etc., or can your present equipment handle all these operations with successful results? Is your capacity flexible enough to handle peak loads?

These are the major items to be figured into the cost of your own heat treating department—there are others which arise in special cases.

The problems listed here have been faced and overcome by commercial heat treaters. They know the answers because heat treating is their business—just as the manufacture of your products consists of solving numerous problems in your business.

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duction heating to automatic screw machines, so that a metal part can be machined and completely or selectively heat treated at the same time.

Mr. Stevenson

Trend in heat treating today can best be visualized by looking backward. Little more than twenty-five years ago, a few electrically heated box furnaces were moving in alongside of gas and oil box furnaces. Oil baths were the common means of drawing and cyanide and lead pots were necessities. Parts were packed in boxes with compounds of bone, leather, charcoal and energizers for carburizing. Prepared atmospheres were a mystery and a rich mixture at the burner provided a "reducing" atmosphere.

Hardly more than 25 years old are these new sciences: Bright and nondecarburizing atmospheres; modern high speed nicarbing furnaces; bright treating of stainless; electronic heat treating; isothermic annealing; carbon restoration; gas carburizing; and vacuum heat treating. Processes become more complicated and equipment more complex, until smaller companies sometime find it impossible to have the technical help or equipment for the many processes required for their products. Thus, the commercial heat treating shop grows up into a major industry.

Next twenty-five years will see even greater activity in harnessing chemistry, electronics, physics and the automatic machine to the job of making metals do their share in the Atomic Age.

Mr. Staples

Improved heat treating equipment and practice permit modernly equipped industry to realize real savings. Machining costs are being cut by use of bright hardening and bright case hardening furnaces. Surface protection during heat treating by use of better furnaces and atmosphere generators is becoming widespread. Tool heat treating is simplified. Small parts of intricate shape which were difficult to harden clean and without distortion can be perfectly hardened or carbonitrided.

Mechanized furnaces are saving handling costs. Shaker hearth, pusher and new types of conveyor furnaces are reducing attention required while at the same time turning out better work. Automatic quench facilities attached to furnaces have eliminated dirty and hazardous open quenching, and have also eliminated the scale caused by contact with air in older hand quenching operations.

High temperature, high production, rotary hearth furnaces (using protective atmosphere) feed modern forges with clean billets. Forging costs are cut by getting maximum production, by increasing die life and by forming cleaner work by reduction of scale. Jet engine alloys are being solution heat treated in similar equipment.

Heat treatment requirements will become more stringent to meet the exacting specifications of new materials. Furnace equipment, salt baths and induction heaters will be produced by our industrial furnace manufacturers to meet these requirements.

Mr. Adam

During past year, salt bath heat treating has not only kept pace with other heat treating methods, but has advanced into entirely new fields. Noteworthy has been the new salt bath process developed by General Motors Research Division, known as "Aldip" process for aluminizing steel assemblies. The Aldip process was demonstrated publicly for the first time at the 1953 Metal Show in Cleveland. A number of installations have already proved merits of the process for imparting corrosion and heat resisting properties to plain steel assemblies.

In the defense program, salt baths continue to play a major role. They solved the problem of hardening steel cartridge cases, and during the past year, were adopted by practically every supplier to the Ordnance Department. Use of salt baths for brazing steel assemblies is expanding, especially where brass is used as the brazing medium.

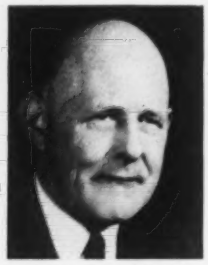
Mechanized salt baths had a decided impetus in 1953. Scores of installations were made for carburizing, martempering, neutral hardening, annealing and heating for forging for a variety of products. These conveyorized designs have been improved to a point where only one operator is required to handle a tremendous production while the clocklike precision of the mechanism maintains uniform time-temperature processing cycles.

Mr. de Coriolis

Endothermic atmosphere gas generators, which were so important in advance of gas carburizing, have now opened up closely allied fields of carbon control for all ranges of heat treatable steels. Gas from these generators (here designated as RX gas) has valuable carburizing potentials that can be varied by controlling the dewpoint of the gas.

This characteristic is applied in homogeneous carburizing. When low carbon steel of light gage (0.015 to 0.020 inch), is heated in such an atmosphere, carbon will diffuse from the surface inward and throughout the whole cross section of the metal, carburizing it to one definite percentage of carbon, which is in exact balance with the potential of the surrounding atmosphere. Additional

A. E. TARR
Manager, Sales Engineering Division
Leeds & Northrup Co., Philadelphia



F. E. HARRIS
Metallurgical Consultant
Dow Furnace Co., Detroit

A. M. WHITE
Group Leader, Research Laboratory
American Cyanamid Co., Stamford, Conn.

FREDERIC O. HESS
President, Selas Corp. of America
Philadelphia

exposure of parts to this atmosphere will not further change the carbon content of the steel.

Outcome of this development is production of light gage steel parts which are stamped out of low carbon strip. In process of heat treatment, stamping is brought up to desired carbon concentration and quenched, combining the homogeneous carburizing and hardening operations in one and the same furnace. Cold forming economy of low carbon steel is combined with the mechanical properties of higher carbon steel.

☑ Mr. Tarr

Progressive heat treaters are taking advantage of technological developments offering more precise and more complete control of important variables. In an increasing number of plants doing carburizing, active carbon in furnace atmosphere is continuously measured and automatically controlled throughout entire heat treating cycle. With not only time and temperature, but per cent carbon as well, under precise regulation, heat treaters have a means of getting exact physical properties the metallurgist specifies.

Where experimentation is necessary, heat treater can change one variable, hold the others constant, and thus find the combination which gives desired results. He can duplicate these conditions with certainty on a production basis, turning out batch after batch having uniform physicals. This revolutionary carbon control development, usually carried out in pit-type furnaces, is beginning to be applied to specially designed horizontal furnaces in which load, from the time it enters furnace until it leaves quench, is never exposed to air, but is kept in a precisely regulated carbonaceous atmosphere.

Another form of controlled atmosphere, which is raising quality of both ferrous and nonferrous parts, is steam treating for many tempering, annealing and stress-relieving operations. This method gives superior resistance to wear, longer life, better machinability, and greater resistance to corrosion. Through its use, many time-consuming finishing operations are reduced or completely eliminated. Powdered iron compacts (heat treated in steam atmosphere) show a marked increase in compressive strength.

☑ Mr. Harris

Metallurgical processing of finished parts is vitally concerned with problems involving surface protection, minimum dimensional change and uniform physical properties. Adequate protection often determines optimum operational procedures.

Here, as connecting link between the heating and cooling sources, vestibule construction may play an important part in pressure control and in furnishing stations for conditioning the charge. Control of heating and quenching rates, conditioning and purge factors, fixturing and other controls affecting load density of charge, added to matching of atmosphere compositions with product demands are all problems of operational rationale. These elements vary in turn with metallurgical requirements and dimensional characteristics of part.

Fullest development of metallurgical possibilities demands a careful evaluation of these factors. Vital aid to process control and development is a complete heat treating unit for pilot runs. Such a unit serves two important purposes: 1. Determination of optimum processing for new designs or manufacturing methods; 2. Check testing for production installations. Atmosphere developments are now at the stage where refinements in operating controls may well afford greatest benefits to field of heat treatment.

☑ Mr. White

It appeared inevitable a few years ago that use of molten salt baths, particularly for carburizing, would decrease. That these expectations have been unfulfilled can be attributed to resourcefulness of the metallurgical industry in finding new applications for molten salt baths.

Activated carburizing baths of the original type have been largely replaced by compositions which are completely soluble in water after oil quenching. Neutral type salts are used increasingly in various forging and extrusion operations where they serve not only as the heating medium but also as a lubricant.

A significant development applying to the low temperature nitrate-nitrite type salt bath is the use of water to lower its minimum operating temperature. Water added cautiously at a temperature below 350° F remains in the bath above its own boiling point and up to the boiling point of the mixture which, like the freezing point, is lowered by an amount which depends on the amount of water added. Presence of water increases quenching power over that of bath at the same temperature without water.

☑ Mr. Hess

Fuel fired equipment for heating and heat treatment will further progress by automation. There are two basic reasons: 1. Automatic operation results in a better, more uniform product; 2. Costs per piece are lowered because of less handling cost, higher production rates and, in many instances, material savings.

For example, a press forging formerly requiring 2250° F and 17

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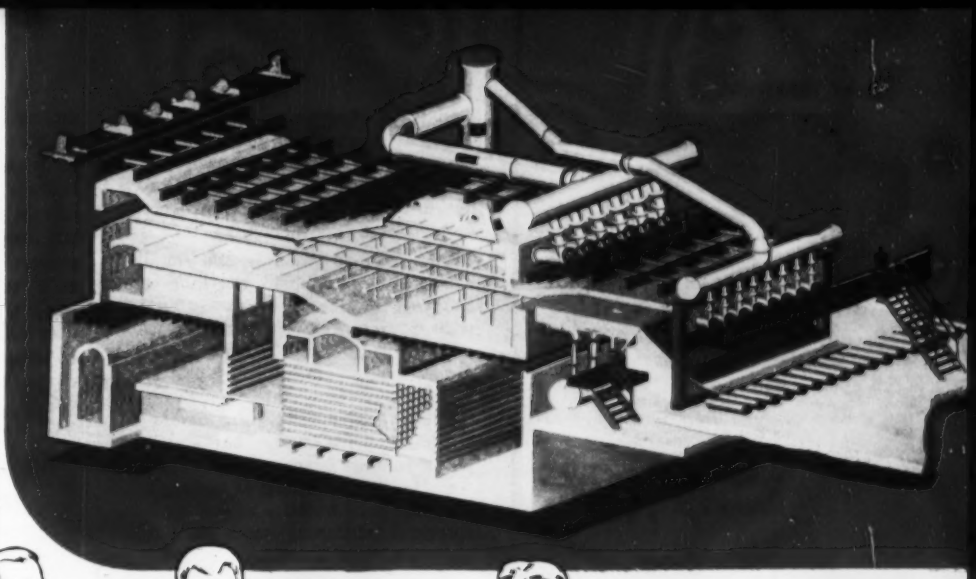

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Sales Manager, Thermal Research & Engineering Corp., Conshohocken, Pa.

pounds of steel is now produced in identical forging equipment at temperature of 1840° F with two pounds saving in steel. In addition, end product has superior physical properties and requires less machining.

For turbine blades and similar equipment, automatic charging and heating equipment are co-ordinated with forging press at production rates of 2400 per hour. Heated piece is automatically placed from gas fired heating machine into forging die. Similar progress is being made in automation for flame hardening of parts, such as gears and spline shafts. Also in silver brazing of metal parts ranging from bicycles to cooling coils for air conditioning units, shell fuses and radar equipment.

In the steel industry, continuous heat processing is making progress. Broader adoption of the advantages can be expected during 1954. Bar stock is heat treated on a continuous basis in sizes ranging from ½ to 5 inches in diameter. High speed heat processing makes it possible to normalize 9 and 16 inch diameter pipe on a continuous basis at the rate of 100 tons per hour.

Mr. Ipsen

Progress is being made in determining the exact heat treating conditions to produce a given result. Corresponding advances are being made in industrial heating equipment to provide these conditions. Quality control is a far more exact science than ever before.

New equipment is more highly mechanized, and automation is becoming a must for many processes. Better design makes new equipment more efficient, more effective, safer and easier to maintain and service. Sales curve of the heat treating industry offers the best proof of the growing importance users place on new equipment. Installations of furnaces and ovens in 1953 were almost two and a half times the volume of 1940.

Mr. Darrah

Past year, with its record of unusual commercial activity, saw expansion of production heat processing on an extensive scale and at a record breaking rate. Trends were to develop new processes, to apply new techniques developed by research and to expand productive equipment. Universal effort was to eliminate manual labor and controls. Result: Rapid increase in automatic processing with the concurrent development of automatic machinery.

Example of this trend is large normalizing furnace which was installed by a leading manufacturer of seamless steel tube. It handles tubes from 2⅜ up to 10-inches in diameter by 48-feet long at rate of 60 tons per hour. Illustrative of modern trends is that almost 100 per cent of the output is normalized. Only a few years ago, normalizing was relatively rare and applied only to a small percentage of tubes produced.

Progress is being made in connection with the heat treating of precipitation hardening alloys. A large precipitation heat treating line was put into operation for beryllium rods, wire and coils at the rate of 2000 pounds per hour. Precipitation hardening is being expanded on large scale for aluminum industry particularly in connection with the large press program sponsored by Air Force.

Mr. Whitten

Single stack, portable base, annealing furnace system is the closest thing to a continuous process that will allow a multiplicity of treatments. Past year has seen firm establishment of the single stack furnace as the most modern way of steel coil annealing.

Every important contract for new furnace equipment was placed for single stack furnaces. Their speed, flexibility, low maintenance and operating cost, and exact control make multiple stack furnaces obsolete.

During 1953, the high input "O" type firing tubes were proved to be an effective type of radiant tube heating. A convection system, with lack of sand seal disturbance and durable base construction, has met with complete approval. Continuous research on radiant tube firing, convection heat transfer and high velocity gas movement promises increased steelmaking efficiency.

Mr. Lombard

Important strides are being made today in utilization of high rates of convection heat transfer to metals at temperature levels much above those considered practical in the past. These advances are made possible by designs of furnace and combustion equipment which will efficiently consume greater quantities of fuel per unit combustion volume. Combustion techniques utilized in this new equipment in many cases is direct result of recent developments in the combustion systems of guided

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In this photo you will find a Johnson Sleeve Bearing of every type used in industry. Various alloys . . . bronze, babbitt or aluminum . . . can be selected . . . and different combinations with bronze or steel are available. Johnson Bronze facilities make possible a size range from tiny bearings up to King Size, 14" OD, 17 inches in length. Since Johnson Bronze produces all the types of sleeve bearings, their engineers can give you unbiased advice on the bearing best suited to your application.

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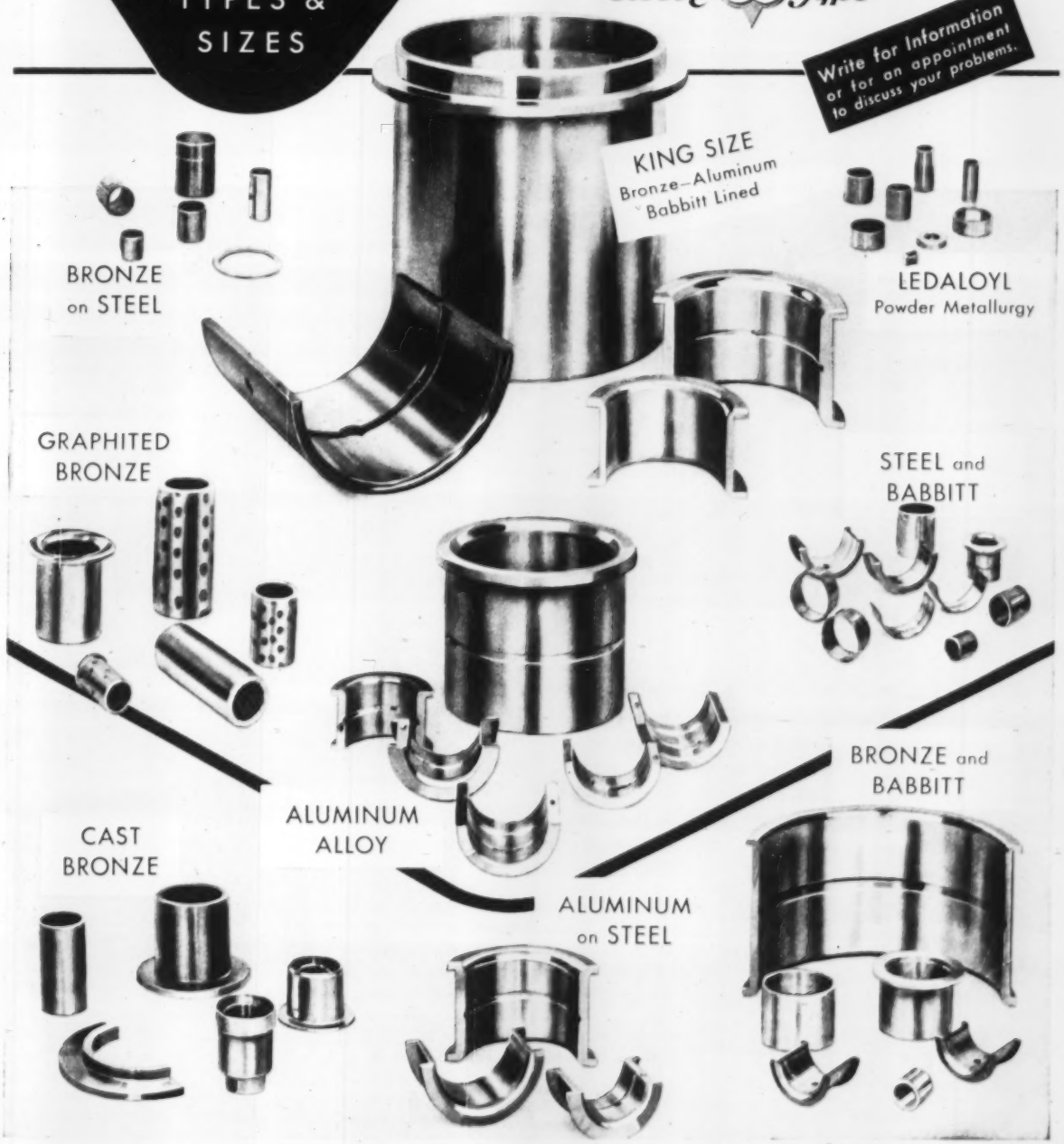
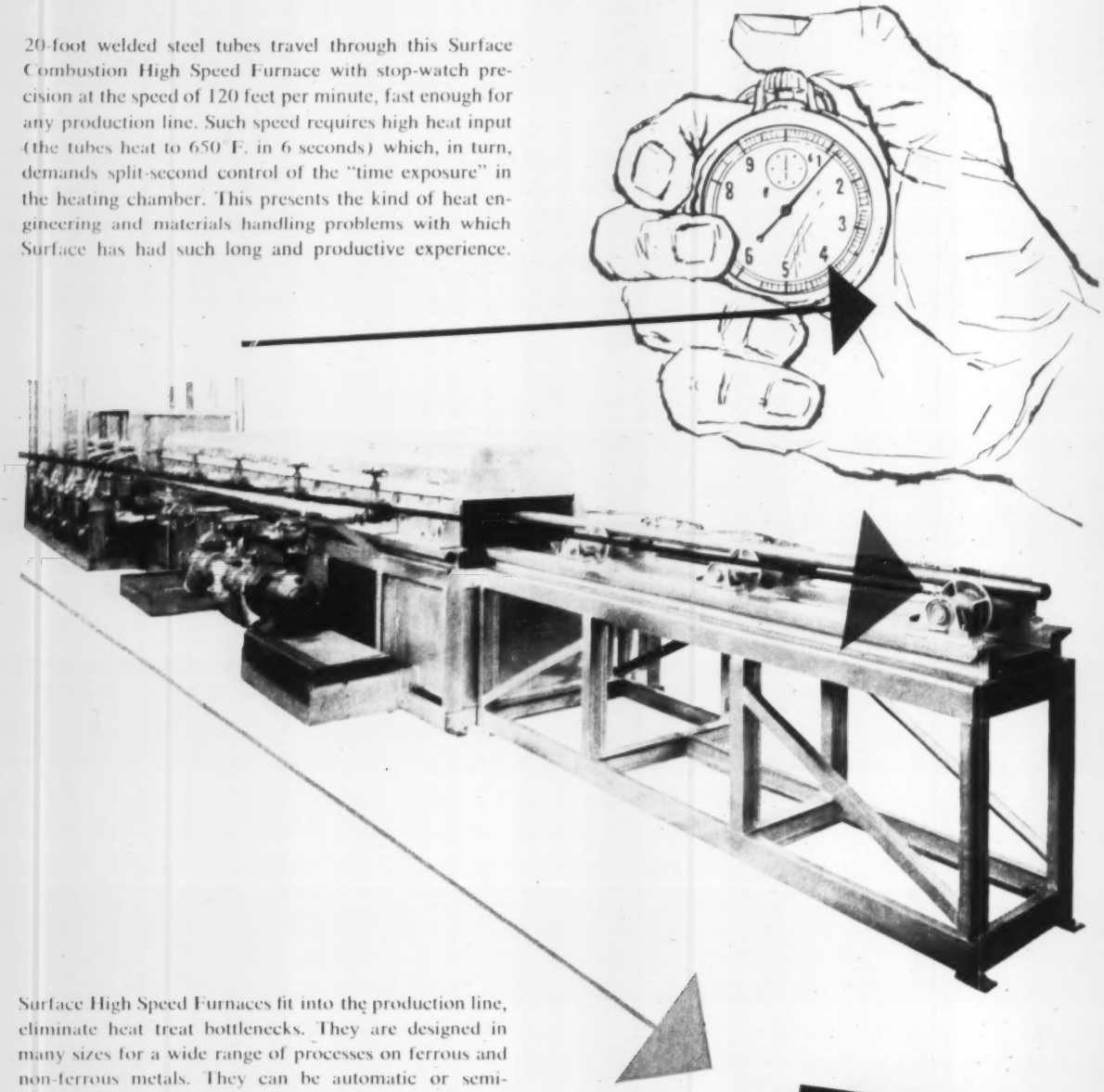
Sleeve-Type

Write for Information or for an appointment to discuss your problems.



stress relieving at 120 feet/minute

20-foot welded steel tubes travel through this Surface Combustion High Speed Furnace with stop-watch precision at the speed of 120 feet per minute, fast enough for any production line. Such speed requires high heat input (the tubes heat to 650°F. in 6 seconds) which, in turn, demands split-second control of the "time exposure" in the heating chamber. This presents the kind of heat engineering and materials handling problems with which Surface has had such long and productive experience.



Surface High Speed Furnaces fit into the production line, eliminate heat treat bottlenecks. They are designed in many sizes for a wide range of processes on ferrous and non-ferrous metals. They can be automatic or semi-automatic, gas or oil fired. Write for Literature Group H53-5 and see how these "hot-rod" furnaces can give you savings in heating time, equipment cost, fuel, maintenance, floor space, metal, and labor.

Surface
HEAT TREATING EQUIPMENT

SURFACE COMBUSTION CORPORATION • TOLEDO 1, OHIO

ALSO MAKERS OF

Kathabar HUMIDITY CONDITIONING *Janitrol* AUTOMATIC SPACE HEATING

W. H. HOLCROFT
Vice President, Holcroft & Co.
Detroit

A. F. HOLDEN
President, A. F. Holden Co.
Detroit

JOHN G. HOOP
Industrial Heating Engineer
Westinghouse Electric Corp., Pittsburgh

missiles and jet engines.

Higher heat release rates, when designed to provide higher velocity to the products of combustion entering the furnace, offer high convection heat transfer coefficients as a useful tool to be added to the radiation coefficients. Velocities necessary to make such an effect are not possible with conventional combustion equipment. By keeping the inside furnace dimensions small, these high velocities can be maintained throughout to provide uniformity. For a given over-all heat transmission, increase in convection can allow the use of lower refractory temperatures with the accompanying reduced maintenance.

☑ Mr. Holcroft

Although there is a decrease in heat treating requirements for the defense program, there is a continuing and increasing demand for industrial furnaces to meet the needs of civilian production. Manufacturers who are expanding and modernizing their operations realize the importance of buying furnace know-how along with their purchases of heat treating equipment. Furnace users in general want the best, most trouble-free equipment obtainable. It must serve their requirements both mechanically and metallurgically.

Looking forward to the new year we foresee an increasing demand for both automation and gas atmospheres in industrial furnaces. These demands will continue to form a self-perpetuating reservoir of new business.

☑ Mr. Holden

Trends in heat treatment indicate a continued interest in austempering and martempering. There is active interest in descaling and sand removal using salt baths. Cleaning titanium is one aspect of this picture.

Research is directed to improvement of products by separating out chlorides from quenching salt baths to maintain the quenching rate uniformly at any temperature used, from 350 to 700° F. In annealing of various classes of steels, with or without scale, additives can perform a function in either reacting with scale or maintaining a better surface finish. Work with additives also indicates that pot life can be increased substantially, as well as electrode life. Apparent reason for this increase in life is prevention of intercrystalline corrosion at grain boundaries.

☑ Mr. Hoop

Year 1953 has seen increased emphasis on completely automatic furnace units designed to lower operating costs by labor reduction. In many cases elaborate metallurgical cycles are involved for special results in grain refinement, surface de-oxidization, recarburization or carbonitriding. Objective in many cases is use of less expensive, lower alloy materials to meet exacting requirements of machinability or physical properties.

Development of higher temperature alloys for aircraft gas turbine appli-

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HIGH CARBON
STAINLESS
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Tell us the way you want it. We'll follow your specifications.
Cross-sectional areas up to .250" square; widths up to 3/8"; width-to-thickness ratio not to exceed 6 to 1.
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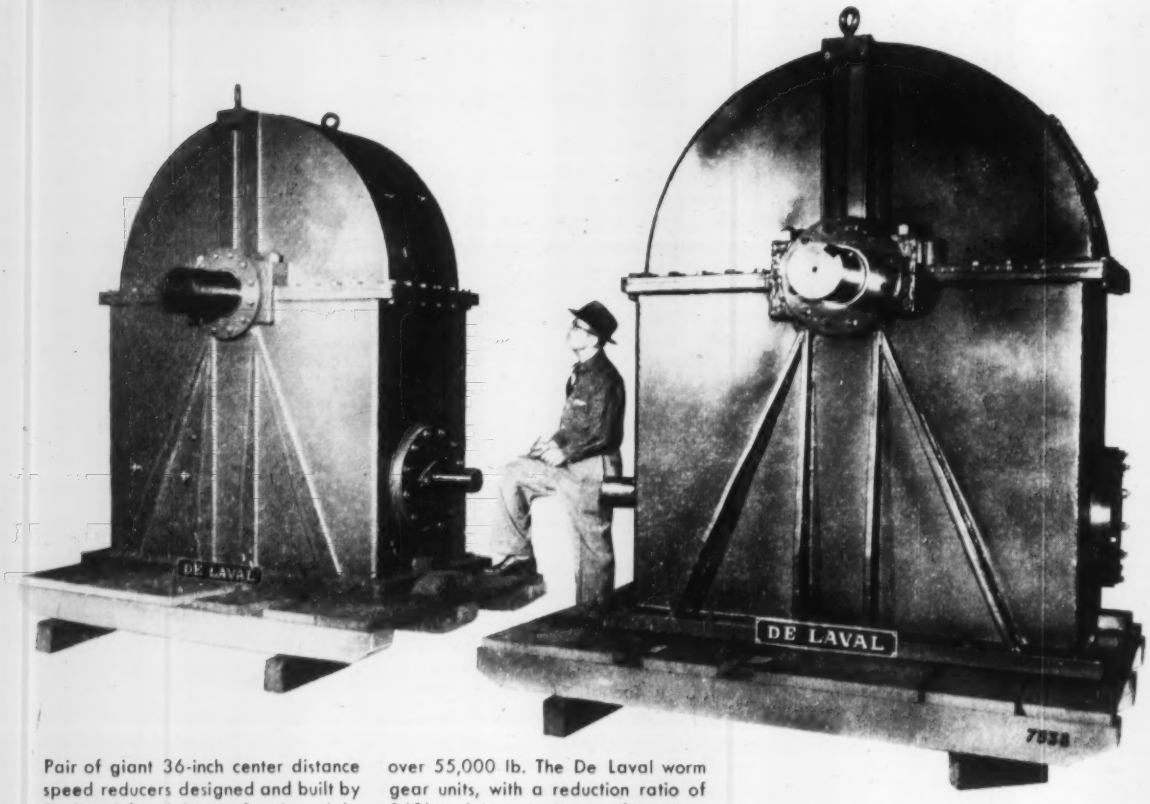
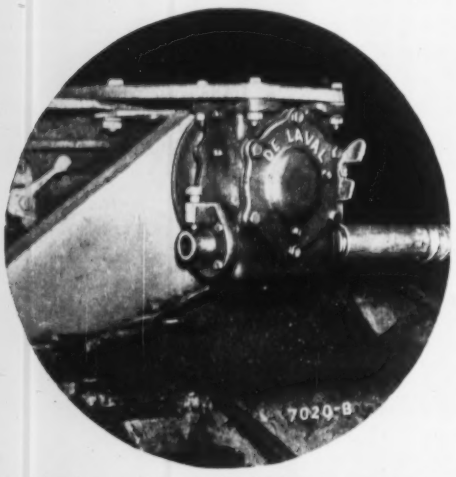
DE LAVAL
SPEED REDUCERS

from dwarf to giant size



Pair of giant 36-inch center distance speed reducers designed and built by De Laval for slab transfers in a slabbing-blooming mill. These slab transfers are used to convey steel slabs up to 12 in. thick and 42 in. wide, weighing over 55,000 lb. The De Laval worm gear units, with a reduction ratio of 26⅔ to 1 in a single set of gearing, are each driven by a 200 hp, 410 rpm motor coupled directly to the input shafts of the slab transfers.



Here's one of the smaller De Laval worm gear speed reducers with a 3″ center distance being used for a new coal drilling machine.

De Laval heavy-duty worm gear speed reducers seldom require attention under the most rugged operating conditions. They make a quiet, close-couple compact drive. They permit high ratio reductions in a minimum of space and withstand severe shock loads without damage. De Laval builds all sizes from 3″ to 36″ center distances for transmission ratios of 3.1:1 to 100:1 in single reduction units and ratios of 50:1 to 8000:1 in double reduction units. Whether you need dwarf or giant worm gearing, consult De Laval for engineering assistance. *Send for De Laval Manuals G-WBV and G-WWH containing data on single and double reduction units.*

DE LAVAL *Speed Reducers*

DE LAVAL STEAM TURBINE COMPANY

860 Nottingham Way, Trenton 2, New Jersey DL210

H. N. IPSEN
President, Ipsen Industries Inc.
Rockford, Ill.

cations has increased operating temperatures in heat treating furnaces, and has led to new material handling methods for charging and discharging work.

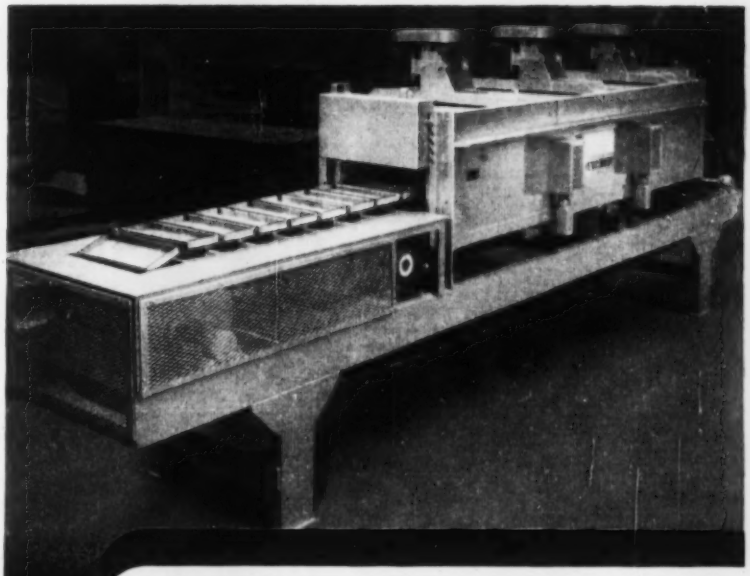
Expansion of the aluminum industry, especially in the field of larger, heavier extrusions and forgings, resulted in design of new heat treating equipment for these aluminum alloy parts. Furnaces are characterized by rapid internal air recirculation, producing temperature uniformity of plus or minus 2½ degrees F over large areas. Elaborate mechanical equipment removes and fully quenches the charge within a total time of 10 seconds after discharge begins.

Annealing of coiled materials in strip mills is done more and more in non-explosive, dry, nitrogen-type atmospheres, which permits the handling of a variety of products in same atmosphere, and eliminates any explosive hazards.

Mr. Ipsen

Past few years has brought about tightening of engineering specifications on heat treated parts in accuracy of case depth, hardness and decarburization. Also, greater competition between manufacturers is requiring cost cutting methods in heat treatment along with greater improvement of quality.

To meet these demands, automatic controlled atmosphere furnaces have been designed with forced convection radiant tube heating which has increased the heating rate and improved temperature uniformity. Maintenance costs are reduced due to ceramic radiant tubes and a fan integral with the motor having water-jacketed bearings with a low starting torque. These improvements, along with the cold chain for transferring the work load into the quench, have gone a long way to



Specially Designed
for Continuous Production

HEVI DUTY

CONVEYOR FURNACE

Of special design for Kohler Co. of Kohler, Wisconsin, this Hevi Duty Conveyor Furnace is being used to heat aluminum and brass billets prior to forging jet engine and other parts. Not only has this furnace been designed for a specific job, but Hevi Duty Engineers also built into this furnace many additional features.

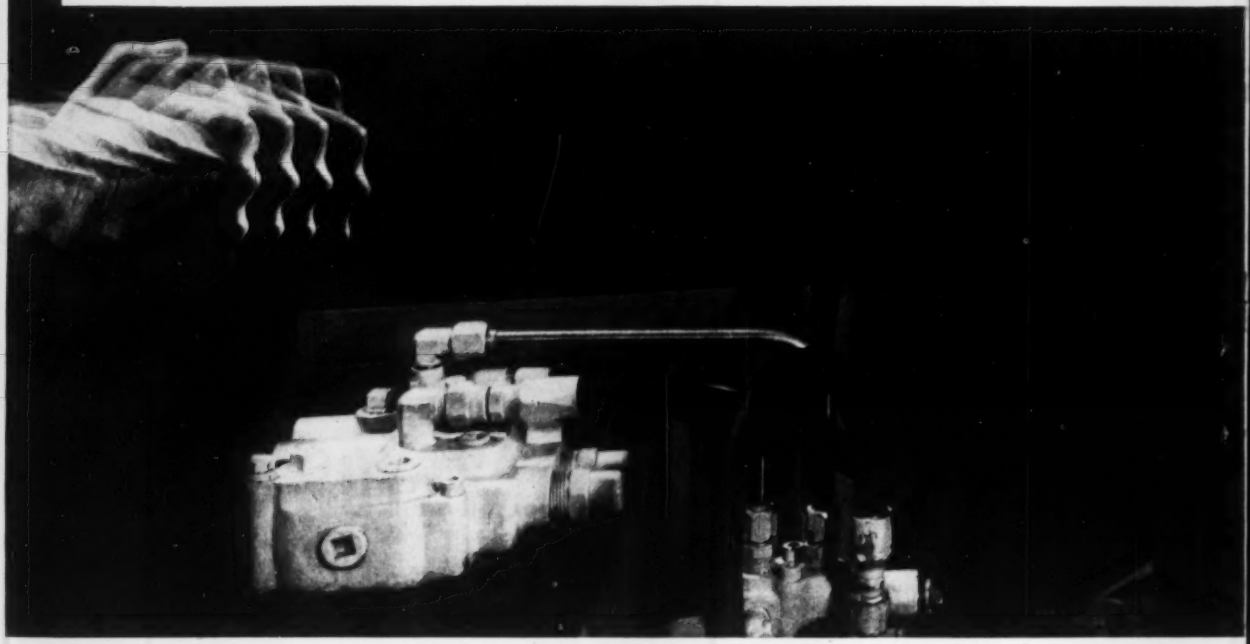
- Notice the three fans which speed the heating of the billets by circulating the heated air, and also assure a uniform temperature in the heating chamber. With this feature, a smaller, more economical furnace is able to do this production job.
- Heat resistant alloy conveyor links and trays mean years of dependable service.
- Versatility . . . by using a variable speed drive to adjust the conveyor speed, this furnace can be used for annealing, tempering, and other heating operations.

Special Hevi Duty Furnaces can be engineered to your specifications and your production system. Let us know your requirements. Our engineers will work with you.

HEVI DUTY ELECTRIC COMPANY
MILWAUKEE 1, WISCONSIN
Heat Treating Furnaces... Electric Exclusively
Dry Type Transformers *Constant Current Regulators*

NO JERKS, NO JIGGLES...

New Parker mobile-equipment valve positions a load gently and exactly



Special lift truck demonstrates gentle, exact control of new valve. Stop-action photo

Parker announces a new line of directional-control valves for mobile-equipment applications . . . lift trucks, agricultural machinery, and earth-moving equipment. These valves provide gentler and more exact positioning control than any other. Here's how:

The new valve has full feathering on both open-center and cylinder ports. This feathering is especially good for two reasons. First, a load check eliminates dead spots and back flow to the pump. Second, unique spool notches provide sensitive rate-of-flow control during crossover. A full parallel circuit enables you to do several operations at once.

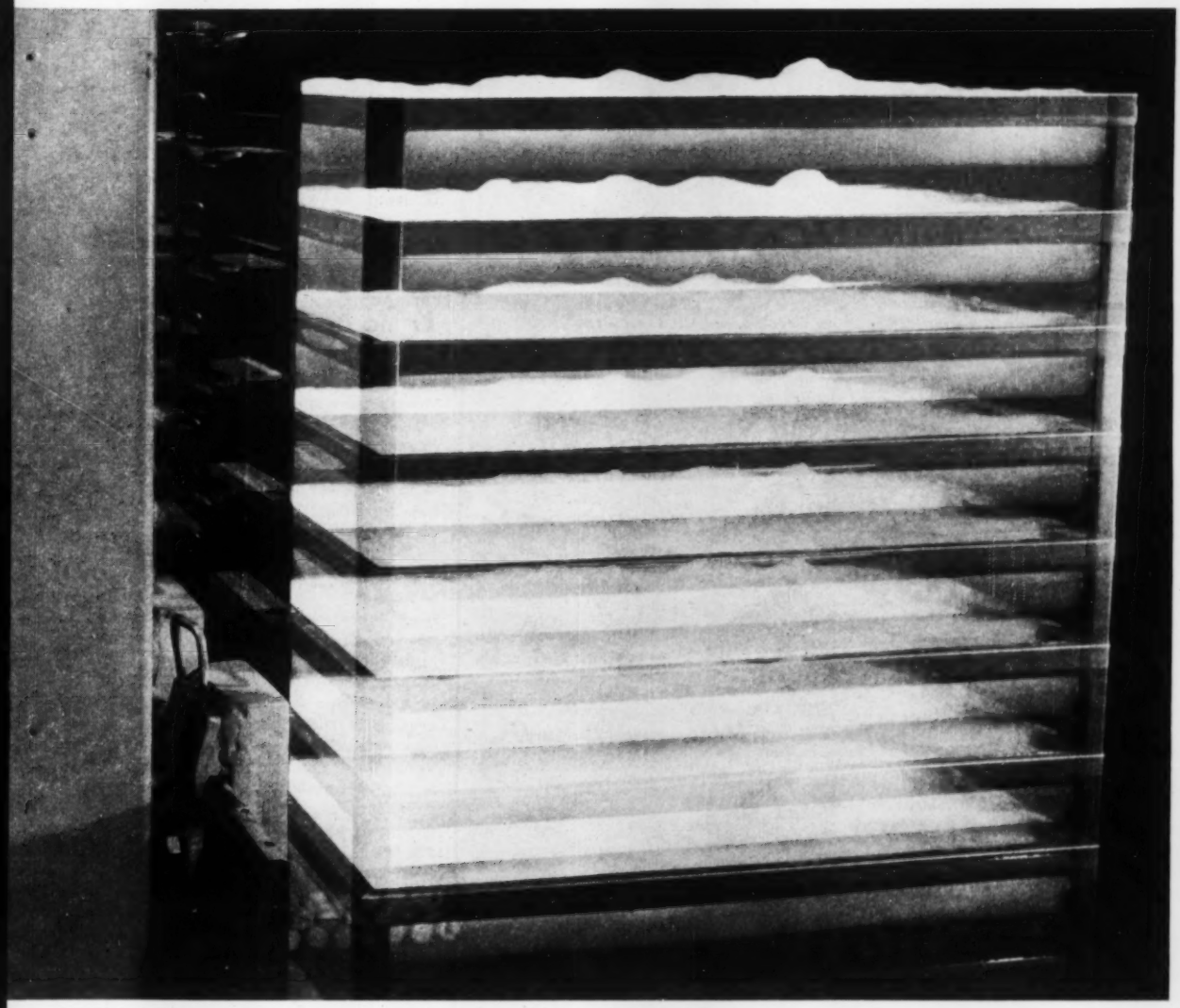
These new Parker valves are offered in 1, 2, 3, or 4-spool designs, with capacities up to 35 gpm. Flow characteristics can be tailored to your specific applications. For instance, the valve has a built-in carry-over for piping from one valve to another without pressurizing seals. You can add additional functions in this way.

Both designers and salesmen will be enthusiastic about the many other features and benefits. Why not call in Parker today? We would like to discuss these valves in detail . . . and work with you in developing their proper application on your equipment.

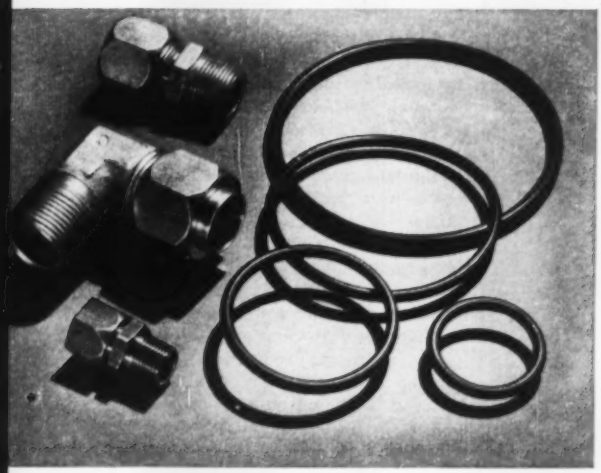
INDUSTRIAL HYDRAULICS DIVISION
The Parker Appliance Company
17325 Euclid Avenue, Cleveland 12, Ohio

Parker

Hydraulic and fluid system components



shows tank of soapy water (suds on top) being raised without a ripple in the water line.



What other Parker products for hydraulic and fluid systems interest you? Triple-lok flare fittings? Ferulok flareless fittings? Synthetic rubber O-rings? Any other products?

THE PARKER APPLIANCE COMPANY
Section 201-N
17325 Euclid Avenue
Cleveland 12, Ohio

Please send me the following information:

☐ Hydraulic control valve Bulletin 1551 A

☐ Information about these other Parker products:

NAME _____ TITLE _____

COMPANY _____

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Send for catalog of complete information about Parker hydraulic control valves. If you'd like to know more about other Parker products, list them on the coupon or write to the above address.

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20 YEAR SUCCESS STORY

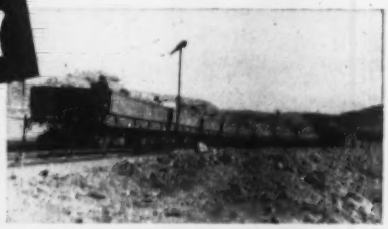
DIFFERENTIAL

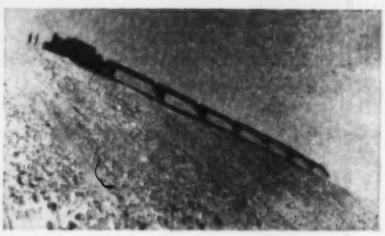
Air Dump Cars Serve the World's Richest Copper Mine

At this impressive ore deposit in Chuquicamata, Chile, Differential Air Dump Cars are used exclusively.

From an initial order for 20 cars (shipped in 1929) the Chuquicamata fleet of Differentials has grown to 120 cars. (And 60 additional cars are on order.) All dump cars purchased for this mine since the initial order in 1929 have been Differentials.

Today's Differential Air Dump Car shows some refinements but sticks to the original double-trunnion, double-fulcrum design which has earned a reputation for speedy, trouble-free and satisfactory performance through the years.





Action photographs taken at Chuquicamata

OTHER DIFFERENTIAL PRODUCTS:
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DIFFERENTIAL
STEEL CAR COMPANY
FINDLAY, OHIO

SINCE 1915—PIONEERS IN HAULAGE EQUIPMENT

eliminate maintenance problems.

With introduction of a dew point controller, atmosphere control in furnaces is completely automatic. Manufacturers who do not have available trained metallurgists and heat treaters can have benefits of automatic controlled atmosphere heat treating showing minimum distortion of bright, scale free work with no decarburization and carburization to exact specifications.

Mr. Chesnut

Induction heating continues to expand into new fields; demand for equipment remains heavy. Aircraft requirements for special steels and heat resistant alloys have boosted interest a hundred-fold in vacuum melting. There is hardly a supplier who has not turned his interest in this direction.

There still is much to be learned regarding vacuum melting. Many newcomers to the field will have to learn by experience what not to do to get good metal. Tonnage melts in high vacuum may not be too far off.

Another field growing in interest is low frequency or dual frequency heating of billets for annealing, forging, extruding or other such operations. Long done in piecemeal operation, production has reached the point where equipment can begin to be standardized and prices made more attractive.

Most induction heating companies will go into the new year with substantial backlogs of orders and with every indication that 1954 will be another good year.

Mr. Cherry

Significant strides are being made by industry toward goal of moving material without interruption through in-line heat treating equipment. Continuous cleaning, annealing and galvanizing of steel strip are examples of such integration.

A major step toward reduced equipment investment and operating costs was taken in 1953 with two large roller-hearth furnaces which combine both heat treating and brazing operations in one furnace. Increased use of electric furnace bright brazing, not only for stainless steels but a wide variety of newly designed parts, is improving products and reducing costs. This method of fabrication will continue to expand in coming years.

Production of heat treated aluminum alloy parts of large sizes, such as plates 11 feet by 40 feet, required development of large continuous furnaces with automatic features.

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TECHNICAL PROGRESS

Inspection

INSPECTION and testing, war-time bureaucrats imposed upon industry by specification, have won full-time, civilian jobs on the production line. Once viewed as a nuisance expense, they are hailed as a sound investment for the future.

Ways and means committees are giving top billing to nondestructive testing. Complete automation, wherever possible, is the over-all policy.

What are the odds on the latter?

A maker of hardness testers that handle up to 800 parts an hour right on the line says: Next step undoubtedly will be toward greater automation, with more production per unit and/or lower operating costs.

Techniques and equipment for destructive and nondestructive testing are being refined. Machines now test parts, components and structures; spectrographic-type instruments, after setting records for speedy analysis, are pinpointing constituents in complex alloys; great things are expected of ultrasonics, fluorography (latter particularly in the medium and low x-ray energy range), xeroradiography and iridium, cobalt-60 and cesium. Lightweight x-ray units (weighing 100 instead of 1000 pounds) combine portability with power to penetrate 2½ inches of steel.

Mr. Lonsdale

A few years ago a noted engineer outlined all the desirable qualities for a hypothetical fluoroscopic unit, mentioning such features as high level of illumination and small focal spot for greater sharpness of image. At the 1953 Metal Show, a unit was exhibited having practically all the characteristics of the hypothetical machine which was only an idea or a dream a short time ago. This is a good example of progress being made in nondestructive testing equipment.

Another field in which I look for continued progress is that of radioactive isotopes. Cobalt-60 has replaced radium to a certain degree for examination of sections from 1 to 5 or more inches thick. Other isotopes, such as iridium and cesium, are coming into use, and I look forward to the development of isotopes suitable for thinner sections and lighter alloys.

Development of lightweight x-ray units must not be overlooked. Although these units weigh only 100 instead of 1000 pounds, they have sufficient power to penetrate 2½ inches of steel. Advantages of easier transportation and manipulation are self evident. They are especially valuable in making field examinations of such things as pipe lines, ships or repairs to heavy machinery that cannot be brought to a testing laboratory.

Mr. Baird

As business and industry become increasingly competitive, our country's great need is the production of a quality product at less cost. As we examine the tools for greater productivity, we are convinced that none

and Testing

gives more satisfaction than the electron-optical instrument for quality control.

An instrument like the direct reading spectrometer is perhaps mandatory for the metal producer and fabricator. Immediate knowledge of the contents of the melt, for example, obviates furnace waiting time that is valued at over $3 per minute.

Exact determination of specified incoming materials of an inorganic nature is a vital necessity. Analysis and control by instrumental methods will save time and money. Quality is insured.

As the need for automation becomes increasingly evident, the instrument maker is a key figure. Such automation will be the signal for unheard of industrial advance.

☑ Mr. Tobey

Use of industrial radiography increased greatly in 1953. Existing facilities were extended and many new equipment installations were made. Artificially - radioactive, gamma-ray sources were supplied in increasing numbers.

Several x-ray equipment companies are offering small, lightweight, more easily portable machines. Acceptance of spot-check radiographs, instead of trepanning welds, will make such equipment particularly valuable. One machine has a 360-degree cone of radiation normal to the axis of the end-grounded snout of the x-ray tube.

Investigations of improved fluoroscopic methods (to supplement industrial radiography) are continuing; results of field trials may be available this year, along with a report on xeroradiography by a large foundry. Several new chemical baths for neutralization of fixer are said to considerably shorten film washing time.

Iridium and cesium: One big claim for the former: Ir-192 shielding containers that weigh as little as 10 pounds for a source of nearly 100-curie strength. Cesium-137, with a half life of 33 years and a relatively-soft, gamma mission of 0.6 mev, is proving of interest to industrial radiographers, particularly as its emission quality falls between Ir-192 and Cobalt-60.

☑ Mr. Hutchins

Several new pieces of testing equipment are available to the metals industry. The Width Gage, for example, is gaining rapid acceptance. A non-contacting device, it continually and automatically measures width of hot-strip steel to an accuracy of ⅛ inch.

Two phototube scanners, mounted 15 feet above the hot steel, pick up light radiated from the strip and convert it into electrical signals. Signals are amplified and used to determine deviations from the chosen gage setting.

Strip widths of 10 to 96 inches can be measured in temperatures ranging from 1350 to 2050° F; indication takes place in less than 1 second after the strip passes under the detector. Strip position can change as much as ±3 inches (vertically or horizontally) without affecting gage accuracy.

With the gage installed after the last finishing stand, a recorder can record width of all strip rolled. Information should enable operators to determine effect of tension on width and prevent necking down of strip because of excessive tension. It may not be necessary to trim edges during pickling or before cold rolling.

New application for the Metals

W. C. HUTCHINS
Manager, Special Products, General Electric Co., Schenectady, N. Y.

R. G. TOBEY
X-ray Division, Eastman Kodak Co. Rochester, N. Y.

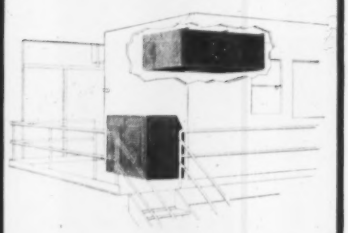
WALTER S. BAIRD
President, Baird Associates Inc. Cambridge, Mass.

WILLIAM K. LONSDALE
Chief, Industrial X-ray Laboratory, J. H. Herron Co., Cleveland

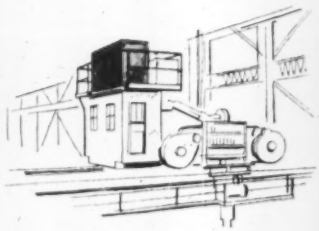
Your industrial air conditioning problem is solved with DRAVO'S COMPLETE LINE OF EQUIPMENT

If your working area is subject to radical temperature variations and unhealthy atmospheric conditions, there's a Dravo air conditioning unit specifically designed to eliminate these hazards.

Dravo industrial air conditioning equipment filters the air, removes dust, dirt and fumes; heats in the winter, cools in the summer and provides year around ventilation.



NEW PULPIT AIR CONDITIONER for blooming mill, strip mill, rod mill pulpit and many other industrial applications. Maintains 80-85°F in summer and 68-72°F in winter. Evaporator section is mounted inside the pulpit with a suitable cabinet for controls. Condenser section is located outside wherever convenient. Refrigerant piping joins the two sections.



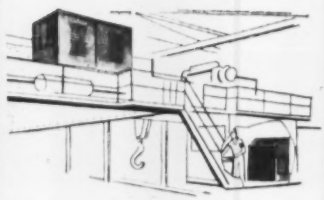
SELF-CONTAINED CRANE CAB COOLERS—mounted alongside the cab or on the cab roof. Only electrical leads and connections required. Thermostat control—fully automatic—maintains 85°F temperature with ambient temperatures up to 175°F. Ideal for installation on all types of cranes working over "hot spots" in steel and other metal-working industries.

DRAVO OFFERS THESE UNITS

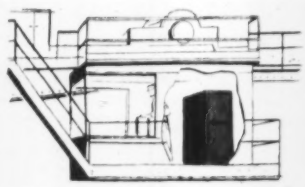
. . . to safeguard health, increase efficiency and improve production in your operation.

ALL UNITS AVAILABLE FOR IMMEDIATE DELIVERY . . . units are quickly and easily installed with a minimum of downtime required. Parts interchangeable on all units.

For more information write to Dravo Corporation, Air Conditioning Department, Fifth and Liberty Avenues, Pittsburgh 22, Penna. Ask for Bulletin SC 1301-91



SPLIT-TYPE CRANE CAB COOLERS—installed in two sections—the heavy condenser unit on the crane wherever you want it—the light cooling section in the cab with the operator. Two sections joined only with refrigerant pipe and electrical connections.



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Chicago

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Turco Products Inc., Los Angeles

Comparator provides nondestructive testing of ball bearing races. Instrument is used to sort metal upon arrival at the plant. During manufacture, small bearing races can be dropped into special test coils to check their adherence to quality specifications. Miniature bearings, similar in appearance but different in characteristics, can be sorted easily by this method.

Mr. Rice

Increase in the use of dye penetrants for nondestructive surface flaw location was phenomenal in 1953.

Numerous field installations in which alkaline precleaning baths are used prior to dye penetrant inspection are operating satisfactorily. But extreme care must be used to make certain that minute alkaline residues that might bridge or obscure minute flaws are completely removed by rinsing.

In applications where fine flaws must be located, a solvent rinse has been used either alone or with alkaline cleaning compounds. Both precleaning compounds and penetrant inspection compounds must be compatible or the inspection is doomed to failure.

Chemical manufacturers have developed noninflammable "safety solvents" that serve effectively as precleaning agents.

Mr. Doane

Use of penetrant inspection methods greatly increased during 1953. Fluorescent penetrants (the most widely used) achieved greatest improvements in sensitivity through new materials and techniques.

Dye penetrants won broad usage in the spotchecking of defects in remote locations or where volume of parts is small. Low initial cost of dye penetrant kits attracted many smaller plants where testing methods were not used.

Considerable progress was made in ultrasonic testing. Older resonance and reflection types of equipment were further refined and their use made easier. Several new types of equipment using ultrasonics are appearing on the horizon.

Great strides have been made in electronic equipment using magnetic fields or eddy current phenomena in testing for defects and conductivity in metals. Refinement of the instruments has increased their stability and reliability under plant conditions. Knowledge is steadily increasing as to the best ways of using these automatic and semiautomatic types of equipment.

In all of the production industries, trend is steadily increasing for fuller automation of inspection and testing.

Mr. McClure

Development of new materials and new manufacturing processes by industry is leading to the development of new ultrasonic testing applications and techniques.

Automatic passage of the search unit over material inspected together with a warning or recording system comprise the basic elements of most automatic and semiautomatic installations. Future here will involve use of auxiliary equipment to process test information into a form for controlling production of material or furnishing a record of its internal condition.

Position of the search unit with respect to material tested is of paramount importance in inspections performed with ultrasonics. When contoured materials are to be inspected continuously, position of the search unit must be changing constantly. This requirement may be met by manual positioning (frequently aided by electric motor controls). However, a programming system has been perfected that positions the search unit over the material and controls the operation of the instrument. Program is recorded on a tape which, once started, makes adjustments necessary to inspect part.

Mr. O'Connor

Growing reliance upon nondestructive testing for increased assurance in quality and performance is evidenced by expanding industrial sales of x-ray, magnetic, sonic and other nondestructive testing equipment.

Abandonment of trepanning (a time-honored inspection method); renewed interest in maintenance inspection (especially in aircraft); and rigorous demands for quality imposed by new prime power sources presage a healthy and rewarding expansion of nondestructive interest.

Current technical developments are in pace with industrial interest, with emphasis being placed on cost per unit item and on filmless techniques. Imminent future will see a greatly increased industrial use of fluorography (particularly in the medium and low x-ray energy range); industrial applications of an improved xeroradiography; x-ray crystal container-filling control devices; and a far more widespread use of iridium as an inexpensive gamma-ray source in the most useful energy range.

Electronic developments have provided more refined control in all fields of nondestructive testing. The most powerful one, the closed television link, has already been adapted to sonic inspection and is expected to find considerable application in x-ray testing.

Although untended, fully-automatic

WILLIAM A. KERR
Vice President, Tracerlab Inc.
Boston

AL F. COTA
Supervisor, Nondestructive Testing,
A. O. Smith Corp., Milwaukee

M. F. HASLER
President, Applied Research Laboratories
Glendale, Calif.

JEROME R. STEEN
Director, Quality Control, Sylvania
Electric Products Inc., New York

inspection has lost none of its appeal, little practical application in nondestructive volume inspection has been made and little is expected. Emphasis is expected to be placed rather on improved planning of inspection situations.

Mr. Hasler

With the advent of new alloys dependent upon complex combinations of elements for their unusual properties (such as those used in high-temperature alloys) or new base materials (such as titanium or zirconium), problems of quality control of chemical composition have become more and more complex.

Fortunately, spectrochemical methods utilizing spectrographs or Quantometers can be readily applied to new alloy systems. However, speed and economy that result from a two-minute analysis of an alloy are being taken for granted. Now emphasis is on higher and higher accuracy of analysis—particularly with regard to principle constituents of complex alloys.

This need is being met by a new combination of techniques employing optical emission and x-ray fluorescence methods. Direct-reading instruments are available—emission Quantometers and x-ray Quantometers; both utilize a flat sample for analysis. Optical instruments are best suited for analysis in the range from 0.001 to 20 per cent, x-ray from 10 to 100 per cent. Accuracies of analysis can be made comparable to the best chemical methods and five minutes suffices for analysis by both methods.

These analytical control systems promise to hold a prominent place in the newer, more automatic methods of metal production and fabrication.

Mr. Steen

In the beginning, inspection and testing were conducted just prior to shipment—usually on each item or batch produced. Such a system required lots of work, produced lots of data but resulted in little information suitable for taking corrective action.

During World War II and thereafter, great strides were made. Techniques were refined and improved and inspection procedures were developed on a scientific basis. Fewer but more accurate samplings were made, and results could be evaluated mathematically on a probability basis. That is, quality level could be stated in meaningful terms and variations of quality could be specified in terms of statistical certainty.

Time has come now for further evaluation and refinement. Business is operating on a plateau. Competition between manufacturers will become keen, indeed. So costs must be reduced all along the line to make a suitable profit or, in some cases, survive.

I recommend an accentuated program of quality control. It can be accomplished by making an all-out effort to find more and better ways of conducting our tests, using more brains and less muscle in the establishment and administration of programs and applying the latest and most efficient techniques to the collection, analysis, evaluation and effective use of test results.

As an aid, attention is called to the part being played by high-speed, electronic data processing machines. Although ground hardly has been scratched, there is little question but what such machines will play increasingly important parts in this field.

Mr. Kerr

With new sources of higher specific activity becoming available commercially and an A.E.C. price policy on iridium-192 due soon, we feel the popularity of this type material for thin section radiography will expand as it has in England, where iridium is a 3 to 1 choice over cobalt-60.

Another advantage of the material is its adaptability for work with small and lightweight containers. For example, an 8 to 10 pound field container can hold intense sources (perhaps up to 100 Curies) with safety.

Cobalt-60, cesium-137 and iridium-192 will find increasing use as complementary sources for solving a wide variety of radiography problems—particularly as more trained technicians become available and knowledge of these relatively new sources become more generally known.

Mr. Cota

Nondestructive testing is the application of a group of tests to determine the quality of a product without harming it for service.

Increased acceptance develops from a realization that: 1. Quality cannot be inspected into the product. 2. Cost advantages accrue from the judicious selection of the tests and their proper location in the fabrica-

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S. A. WENK
Chief, Nondestructive Testing, Battelle Memorial Institute, Columbus, O.

tion sequence. 3. Inter-relation of tests is necessary for complete analysis of the product characteristics. 4. Sales advantages are evident when producing articles of known quality characteristics.

Selection of tests requires a thorough knowledge of the advantages and limitations of the tests of the flaw detection proof test and control tests groups of nondestructive tests. Some of the factors are: 1. Type of material being tested. 2. Degree of loading of the product and its components. 3. Fabrication procedures. 4. Sequence of testing operations with respect to fabrication operations. 5. Ability of nondestructive tests to determine product characteristics in terms of physical tests and actual loading of the product. 6. Value of tests as statistical quality control instruments. 7. Relation of testing costs to intended use value of the product.

Mr. Wenk

Biggest news in nondestructive testing is that it has come of age, and is now a full-fledged member of the industrial team. Turning point came with the realization that it is a necessary nuisance to satisfy inspection requirements as well as extremely potent factor in quality control.

Today, more and more industries are using nondestructive tests to insure quality of the finished product, raw materials and components going into the final end product. Use of such tests at early stages of manufacture prevents the loss of invaluable man and machine hours on parts having detrimental defects that would not clean up during final processing. Ever increasing numbers of nondestructive test installations are being made in receiving departments of a wide variety of industrial plants.

Trend has only been made possible by the tremendous amount of research and development done on nondestructive testing methods and techniques during the past few years. This research has resulted in many improvements to the older test methods and the development of new methods and equipment.

Mr. Tenney

Industries in the United States are well aware that competition on the world market can be maintained only by increasing product quality. Thus quality control has become one of the most forceful components in our industrial organizations.

Within this sphere, nondestructive testing is taking over a continuously increasing responsibility. It has become a key factor in the production of cheaper and better goods—in the airframe industry, railroad industry, foundry industry, welding industry and defense industry, to mention but a few.

Frequency of applying nondestructive testing is no longer a function of economical fluctuation. This phase of inspection has become a new and valuable source of information as to quality of manufactured items.

It also furnishes data to research and development departments, designers, specification engineers, production supervisors and management at large.

Mr. Burrill

An appreciation of the need for nondestructive testing has increased during the past year, as evidenced by the active interest in radiographic equipment we have been encountering. Emphasis tends, on the one hand, toward the requirement for detailed examination of heavy metal fabrications (with wall thicknesses up to 10 inches of steel). On the other hand, we have seen a growing need for lower cost, more portable equipments.

Our 2-million-volt, Van de Graaff, x-ray generators are being installed at Foster Wheeler's new plant in Mountain Top, Pa., and Watertown Arsenal. Small source of x-rays obtained from these units makes precision radiography possible even through thick steel walls.

A 2-million-volt radiographic facility also is available at our plant for experimentation with new techniques and difficult objects and an engineering study is underway to determine design features of a small, mobile, million-volt x-ray generator, low in cost and simple to operate.

Mr. Tatnall

Great advances have been made in testing equipment. For example, a machine has been developed that is actually 8 machines in one. With a capacity of 50,000 pounds, it has only two platens. Lower, which applies load, is driven by a single reversing screw, operating over a speed range of 400 to 1. Upper is load sensitive and acts upon two universal load cells of the push-pull type.

Machine, because of wire-strain-gage load and strain pick-ups, is responsive to abnormally high straining rates and can indicate and record on many forms of dials and recorders —ranging from conventional, large

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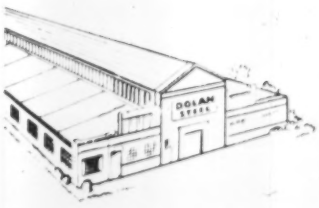

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It also can serve in hot and cold testing and will function as a loading frame for parts and structures in all forms of experimental stress analysis.

Mr. Barath

One of the latest developments in nondestructive testing is the use of ultrasonics, a method of detecting sub-surface discontinuities by the use of ultrasonic pressure waves. An extensive research program is under way in the air-frame industry to establish acceptance standards and to help eliminate some variables now associated with it.

Equipment developments include the "B" Scan and the "C" or frequency modulated, flaw detector. "B" Scan draws a cross-sectional view of the metal being tested, on the face of a TV screen. Any defect causes a brightening of the screen between the lines representing the faces of the material. Shape and relative position of the defect are shown by this method of inspection. Rapid scanning is possible.

"C" Scan shows the plan view of any flaw or flaws in the metal undergoing test, and a permanent record is made by a multi-styli recorder. Recording devices (using a punched tape system for repetitive inspection of a large number of parts) are available, as are surface wave techniques for detecting near-surface flaws.

Mr. Welt

Trend in industry calls for speed and more speed with less labor in testing. In the field of hardness testing, we already have machines which fit directly into a conveyor line, and which can make as many as 800 tests per hour on a "go" and "no go" basis.

Industry would like to be able to do away with the operator, but we are not completely convinced that this is a practical idea. Testing and inspection imply something slightly

LOUIS A. WELT
President, Steel City Testing Machines Inc., Detroit

AL BARATH
Ultrasonic Inspection, Douglas Aircraft Co. Inc., Santa Monica, Calif.

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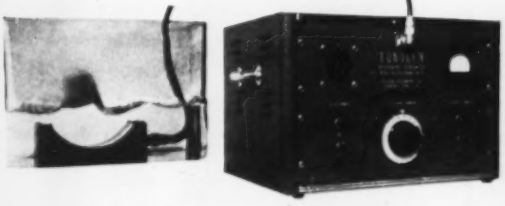

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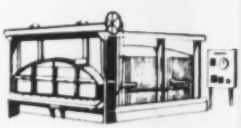

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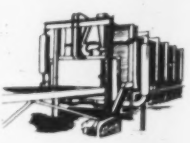

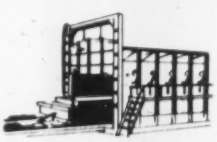

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LEONARD REIFFEL
Supervisor, Nuclear Physics, Armour Research Foundation, Chicago

more than strictly mechanical operations; a degree of judgment is involved, which, we believe, cannot be transferred to even an electronic apparatus. However, the next step undoubtedly will be towards a greater degree of automation with a consequent increase in production capacity per unit and/or lower operating costs.

Same principles, with entirely different approaches, would apply to other types of production testing, including hydrostatic tests, ductility tests and various kinds of proof testing.

In the field of research and laboratory testing, the trend appears to us to be directly opposite. Here speed is no factor, but, instead, technicians are still striving toward perfection with respect to accuracy and new ways to test new materials.

Mr. Reiffel

There are many developments in non-destructive testing that appear to be just over the horizon. Following center around use of high energy radiations:

Work on x-ray inspection devices using TV or image intensification techniques should lead to production line applications in the next few years. Devices offer possibility of contrast control in the x-ray image, as well as doing away with time delays involved in film detection of radiographic images. Technique is already being applied in the medical field.

Second technique that should reach maturity in the next few years is x-ray fluorescence analysis. One need not be much of a dreamer to envision its application to a vast number of testing and control problems. It seems likely that it will be used not only for chemical analysis (one of its earliest applications) but also (to an in-

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THE ULTRASONIC REFLECTOSCOPE enables you to "see" inside a variety of metals and other materials. By means of a distinct pattern on a cathode ray tube, it enables you to locate and evaluate — *quickly, economically* — both surface and internal defects.

APPLICATIONS are unlimited. You can cut wasted machine- and man-hours through *fast, accurate quality-control* of raw materials and machined parts. You can eliminate serious production delays through discovering fatigue cracks in your heavy equipment *before they lead to breakdown.*

OPERATION is simple — all electronic circuits are practically automatic. Penetration is deep — 30 feet, for example, in solid steel.

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OUR NEW BULLETIN 50-105 tells the whole story . . . just *how, where* and *why* the Ultrasonic Testing Reflectoscope can cut your costs from raw materials to finished product. To get your copy immediately, fill out and mail the attached coupon today.

* "We have had over two years experience in nondestructive testing with the Sperry Ultrasonic Reflectoscope. It has been used for the regular inspection of all our extrusion presses. Some 19 press columns have been removed before failure on data provided by the Reflectoscopes. The resultant savings in press damage and down time are estimated to exceed well over $1,000,000."
— Aluminum Company of America

TYPICAL TEST PATTERNS on Reflectoscope screen. At left, material O.K. At right, center "reflection" indicates and locates defect.

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Inspection Department, Allis-Chalmers Mfg. Co., Milwaukee

creasing extent) in coating thickness control and similar procedures.

While it may be somewhat farther in the future, it seems likely that three dimensional x-ray inspection (x-ray stereoscopy) will soon be commercially important. Lastly, x-ray sectioning procedures with oscillating sources and films have already been applied in medical diagnosis and should be readily carried over to inspection problems that are encountered on the industrial level.

☑ Mr. Norris

Non-destructive testing is now enjoying its most rapid period of progress during its relatively short history.

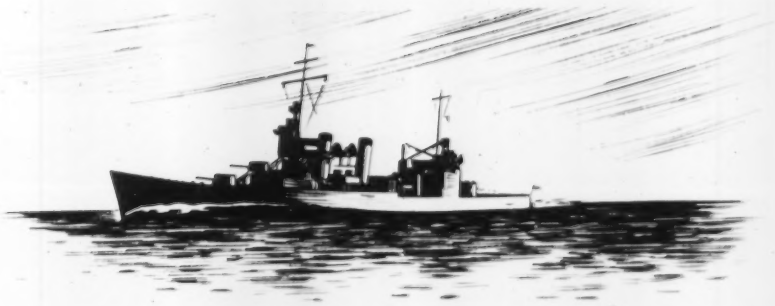
The many improvements and developments in equipment and techniques are overshadowed by acceptance by top management and industry in general. For it has been shown that nondestructive testing more than pays for itself.

Various testing applications, such as ultrasonics, radiography and magnetic particle inspection, are being used more and more to complement results found by others. Each testing method has its own applications to which it is best adapted but additional information frequently can be obtained with a second test.

Many test specifications of the government during the war and since were looked upon with disfavor until the manufacturer discovered that only too frequently specified tests were more help than hindrance. Result: Expansion of nondestructive test facilities in all industries.

Equipment progress in recent years has been in the development of high-energy, x-ray equipment, small, focal-spot and portable, x-ray units and ultra-sonic equipment.

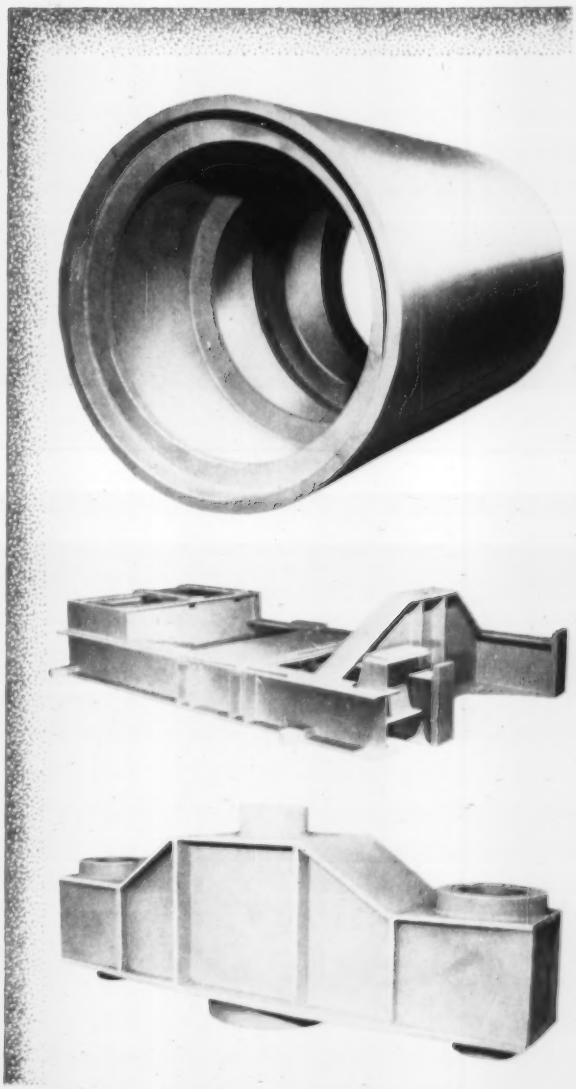
We can look forward to development of other equipment that will



NAVY CRANE RIDES HIGH on ACME Weldments

220 feet below the hook is quite a reach. When the Navy needed a portal crane that big to swing heavy sections on to vessels under construction, the Derrick & Hoist Corporation of Long Island City designed and built a diesel-electric giant with the right reach and a capacity of 50 long tons. *Carrying this big load are all-welded components fabricated by Acme Welding.*

ACME weldments were chosen in place of castings to assure *greater strength, rigidity,* and complete absence of flaws . . . to eliminate pattern cost . . . to provide greater design flexibility. If these advantages of welded fabrication are important to your product —especially when combined with exact adherence to your specifications—why not investigate Acme weldments *today*.



Send us your blueprints for a prompt quotation and ask for our informative booklet, "The FACTS about WELDMENTS and CASTINGS."

Acme WELDING

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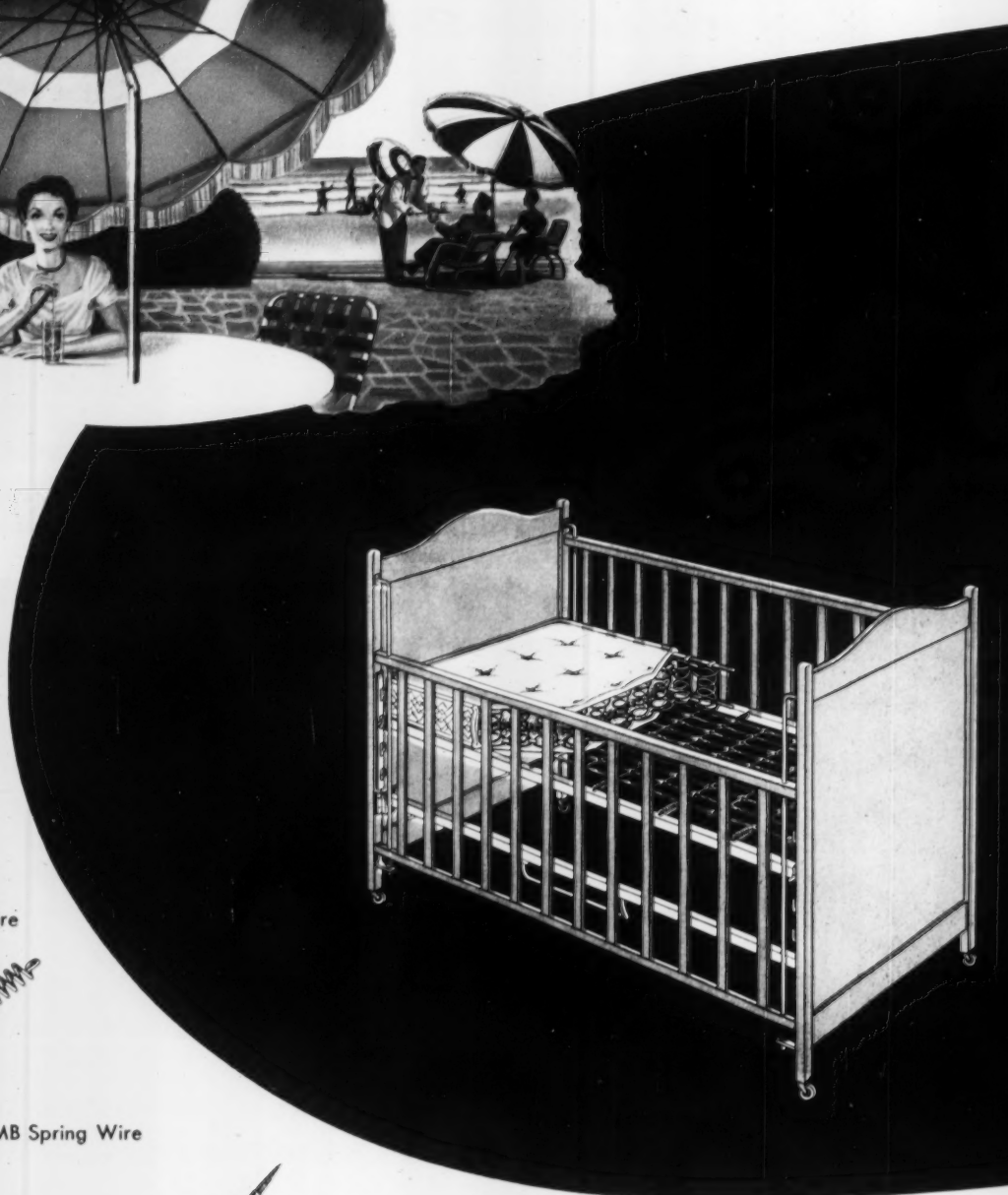
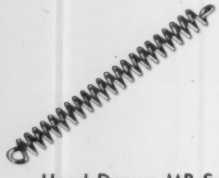
One thing in common...

ALL USE



Oil Tempered
MB Spring Wire



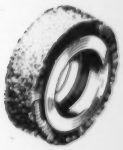
Hard Drawn MB Spring Wire

Picture Cord Wire

Shaft Wire

Spheroidized Wire

Clip Wire



Brush Wire

WICKWIRE WIRE

The products illustrated in our recent series of advertisements run the gamut of variety —from cribs to umbrellas; from automobiles to living room furniture. One thing they have in common, however—they all use Wickwire Wire.

These typical products—just a few among thousands that utilize Wickwire Wire—furnish striking evidence of Wickwire's diversified production . . . proof of our ability to provide you with a single, dependable source of supply for every type of wire you may need in the fabrication of your particular product.

Let us know your requirements in any specialty steel wire. We are prepared to meet your most exacting specifications for wire of high or low carbon steel—round or shaped—in all tempers, finishes and grades.

For the wire you require—check first with Wickwire

THE COLORADO FUEL AND IRON CORPORATION—Denver and Oakland
WICKWIRE SPENCER STEEL DIVISION—Atlanta • Boston • Buffalo • Chicago
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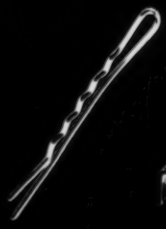
WICKWIRE WIRE

CFI PRODUCT OF WICKWIRE SPENCER STEEL DIVISION THE COLORADO FUEL AND IRON CORPORATION

Hose Reinforcement Wire



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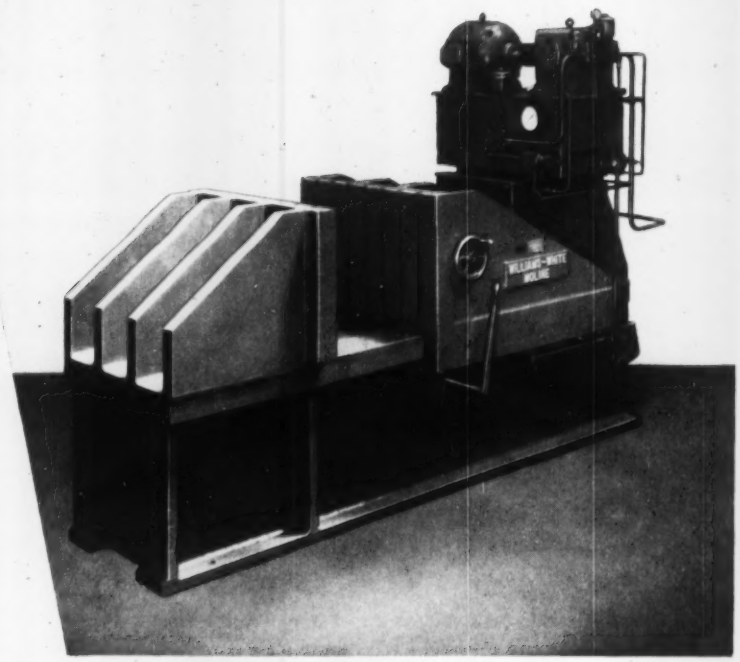
Staple Wire

1854 • 1954

Builders of Quality Machinery for One Hundred Years!

200-TON HYDRAULIC BENDER and STRAIGHTENER

- Stroke, 24 in.
- Daylight, 30 in.
- End Lug and Cross-head, 30 in. by 48 in.
- Sensitive lever control
- Welded steel construction with fixed lug



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EDWARD A. LYNCH MACHINERY COMPANY
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Los Angeles, Calif.

Control to the fraction of an inch is the feature of this Hydraulic Bulldozer built by WILLIAMS-WHITE & CO. The hand lever controls direction and speed of crosshead, the speed being proportionate to the distance the hand lever is moved.

An adjustable stop provides means of stopping crosshead at any point in the forward stroke. The hand wheel, one on each side of the machine, controls the position of this adjustable stop, assuring sensitive, positive control.

In the event the crosshead does not accomplish the desired bending or straightening operation, turning the hand wheel adjusts this stop permitting the crosshead to continue forward a distance proportionate to the amount of adjustment.

This stop may be rendered inoperative when the machine is used for conventional Bulldozer operations.

A CENTURY IN MOLINE

WILLIAMS - WHITE
MOLINE

WILLIAMS - WHITE & CO.

MOLINE, ILLINOIS

W. H. CANTER JR.
Manager, Applications, New Products,
Industrial Nucleonics Corp., Columbus, O.

make nondestructive testing even more important to all manufacturing processes.

Mr. Canter

Recently developed measurement and control devices employing radioactive isotopes have opened a new door to cutting of production costs, and, more importantly, have furnished a stepping stone to automation.

In the near future, we can foresee such processes as rolling, plating, classifying and inspection automatically controlled by non-contacting radiation gages and associated controlling equipment. Engineering and quality control information derived from continuous, recorded measurement already has resulted in greater uniformity of end product and tangible savings in materials and machine utilization.

In cold rolling, for example, process studies enhanced by this recorded information indicate the possibility of closer adherence to rolling specifications which afford producibility in orders and ease in meeting stringent specifications. Also, ability to improve process control eliminates the need for processing overspecification material to assure customer satisfaction at the expense of dollar throughput. This is especially true with tin plate, where customer desires same number of sheets per base box and same black plate thickness per sheet, from order to order.

Gaging devices are available to measure strip from 0.0001 to 0.500 inch, plating thickness of electrolytic tin plate, galvanized strip and hot-dip galvanized and clad strip.

Equipment now in development is capable of measuring and controlling production of such materials as hot rolled strip, pipe, tubing and wire.

Best by test—"brazing with EASY-FLO 45"

● That's what the Diamond Sales Co. of Kansas City, Mo. says about the assembly of their bus and street car fare box shown below. "We've the complete quarter—we've tried every known method of welding and soldering and find that brazing with EASY-FLO 45 is the best. It is as strong as the parts themselves and warping is held to a minimum. It is cheaper for us and saves us money on the clean up job and takes a good plate."

Thousands of other manufacturers say the same thing about EASY-FLO 45 low-temperature silver alloy brazing. This bulletin tells you why.

BULLETIN 20 gives full details about EASY-FLO 45's unmatched speed, reliability and economy in making strong, clean, virtually indestructible joints in ferrous and non-ferrous metals. Write today for a free copy.

LEFT — Arrows point to the four EASY-FLO 45 brazed joints in the fare box proper which is made of heavy brass or steel tubing. The brazed assembly is chrome plated.

RIGHT — The money vault is made of brass tubing to which the cast bottom and top are brazed with EASY-FLO 45. Chain link pin (top arrow) is also brazed.

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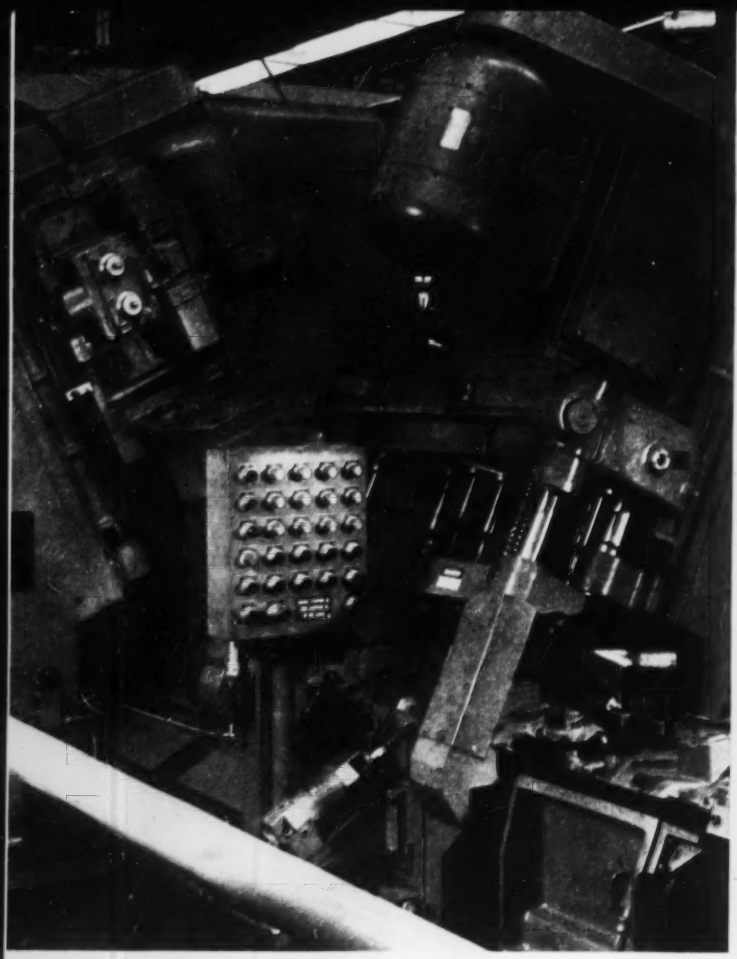

TECHNICAL PROGRESS

Drives and Controls

PRIME MOVERS of industry's machines . . . electric motors . . . will be in the limelight this year as the National Electrical Manufacturers Association rerating program puts smaller, lighter motors on the market.

Without sacrificing dependability or operating life, motor builders are able to pack up to 50 per cent more horsepower into the same frame size, thanks to a code change that permits them to take full advantage of advances in motor design made in the last 20 years.

New motors are just in time, say production planners. As the metalworking industry moves into a vigorously competitive period, it must put its most efficient production team to work. Motors are only a part of that team; working with them are the controls and power linkages.

Electronic and magnetic amplifier regulators will continue their growth in industry, removing the human variable from precisely-controlled production cycles. Far from creating unemployment, experts warn that our rapidly-growing population will force living standards down unless every worker is made more productive with the help of machines.

This then is the challenge to industry and the drives and control builders: Produce a better product, faster; and, at the same time get optimum productivity from every machine on the line.

F. H. ROBY
Vice President, Square D Co.
Milwaukee

Mr. Roby

Mass production methods depend on precision tooling which requires close control. Many new applications are being found for electronic and magnetic amplifier control systems (instead of straight electromagnetic) in view of their greater sensitivity and wider range of adjustment. Acceleration of this trend is certain as experience grows and the natural resistance to new and seemingly more complicated methods is overcome.

Larger markets invariably justify specialization. Spot and other forms of resistance welding sheet metal have required special consideration for some time. More recently, special controls have been designed for electric hoists and trucks used extensively for material handling.

As control equipment usage increases in volume and becomes more widespread in application, marketing channels will be affected. Local electrical wholesalers can be expected to perform more of a function in that connection—particularly in view of greater design flexibility which favors local stocking.

Mr. Crane

There is a very noticeable difference bewteen motor controls of today and the kind of equipment used a few years ago. Trend in many industries, and particularly in the steel industry has been away from the handling and processing of materials in small pieces and toward the continuous processing of materials in long strips. This trend has resulted in the installation of much more adjustable voltage equipment since that type of control is ideally suited for continuous processing. It has also resulted in a requirement for much more automatic regulation of motor speeds.

Progress toward still more automatic operation will, undoubtedly, continue and there will be need for still better, faster, and more accurate regulating devices and methods. Probably the control built a few years from now will differ from today's control as much as today's control differs from that of ten years ago.

Mr. DeMott

An important development is the rapidly increasing acceptance of multi-row type cylindrical roller bearings by the steel industry. Multi-row cylindrical bearings — with their low starting torque, minimum friction at high speed and grease lubrication — have had widespread application in recent years in high-speed multiple strand rod mills, and 2-high and 4-high strip mills. Their one-piece tapered bore inner race design makes mounting and dismounting exceedingly easy with the use of the SKF-developed hydraulic technique for making and breaking interference fits.

I am confident that anti-friction bearing developments for the steel industry will keep pace with steel's need for equipment that delivers a product of high quality and dimensional uniformity. Our development plans will take into account the fact that steel equipment bearings must give longer, trouble-free performance—at high speeds—have simplified, economical lubrication, interchangeability and be easily mounted and dismounted.

Mr. Welser

Individual companies of the chain industry, as well as the industry collectively, have greatly intensified their research in improved mechanical power transmission media or components. Real effects of this research are beginning to trickle into the products and will affect the field of mechanical drives in two ways: (1) By upgrading present chains, more economical selection for present power transmission problems can be made, and (2) The horizons of both speed and power will be widened to include applications heretofore considered impossible.

More accurate knowledge of operating characteristics and therefore the exact requirements for both driving and driven mechanisms, resulting from parallel research by chain users and chain manufacturers, is enabling the incorporation of highly advantageous characteristics in various chains for specific applications. This results in lower actual cost of the transmission media and a consequent wider field of application.

Mr. Hoge

The increase in population and the resulting demands for quality mass

S. C. CRANE
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Milwaukee

RICHARD H. DeMOTT
President, SKF Industries Inc.
Philadelphia

BRINTON WELSER
Vice President, Chain Belt Co.
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JOHN C. SEARS
Executive Secretary, American Gear Manufacturers Association, Pittsburgh

JOHN V. EAKIN
General Manager, Fawick Airflex Div. Federal Fawick Corp., Cleveland

production point to a growth trend in the Control Industry. This growth will embody ingenious solutions to old problems. More specialized controls including the sensitive characteristics of electronics, magnetic amplifiers, transistors and associated devices will be in evidence to a greater degree.

It would be impossible to define in a limiting sense, the scope of these new devices and associated engineering practices. The trend, however, is toward associating these more sensitive and exact controls with conventional controls. Apparently one will not replace but will supplement the other in meeting the demands of an age that requires a closer approach to the "automatic factory".

Some previously unsolvable problems created by these demands are today solvable by the use of vacuum tube circuits (electronics) and magnetic amplifiers. Transitors offer additional promise. In addition to their adaptability to many basic circuits, Electronic and associated devices constitute initiators for control circuits that are infinitely more sensitive and exact than older methods depending on mechanical movements, pressures, temperatures and time.

Mr. Otis

Foreseen for 1954 is a sharp rise in the trend toward standardization in the technique of mounting wheels on shafts. This should bring to many plants substantial savings in labor costs, downtime, and inventory investment. By wheels, I am referring particularly to sheaves, sprockets, couplings and conveyor pulleys.

An important step was the standardization many years ago of shaft sizes. But wheel hubs were still straight-bored, and acceptable diameters of one standard size might vary several thousandths of an inch due to tolerance in cold rolled shafting. It was still necessary either to stock wheels already bored to exact shaft size or to wait for reboring when required.

Further progress came with the introduction of the split collapsible bushing with tapered OD. When wedged into a wheel with tapered ID hub the bushing is forced around the shaft so as to exert a positive grip on it.

During the last decade progress toward the use of taper-bushed wheels has been hastened by two major advancements. Development of a number of taper-bushed designs which permit simpler, faster attachment and detachment of wheels; and, further extension of taper bushings to type B sprockets for roller chain.

Mr. Davidson

Application trends are toward ease of installation and maintenance such as obtained through the use of removable bushings in sprockets and pulleys. Coupling and uncoupling of multiple width roller chain is now made easier by a special assembly feature.

A further trend is toward the integral type drive which combines the motor and fixed ratio or variable speed drive. Automatic controls are also becoming desirable in connection with many transmission applications to maintain quality standards without dependence on the human element.

While both electronic and hydraulic controls remain popular, for variable speed transmissions, pneumatic control is gaining wider acceptance. Reasons are lower first cost, trouble free service, simplicity and ready adaptability to most operating conditons.

Mr. Sears

There do not seem to be any new or startling mechanical inventions or developments on the horizon that will disrupt the trade. Thus, the attention will be focused on retaining and expanding markets for products and devices already well established.

The gear and gear products market outlook from an over-all standpoint appears good. My guess is that 1954 will compare favorably with the 1952-53 average, 1952 was approximately 45% better than the 1947-49 average, 1953 will probably equal or slightly better the 1952 mark.

I am convinced that there is a general awareness of the problems ahead. But it is an optimistic awareness. Our industry substantially supports the concept that our economy will steadily grow; that we will keep pace with, and perhaps a little ahead of, United States and Canadian needs for our products.

Mr. Eakin

With increased production goals, most builders and users of steel fabricating and processing equipment must be prepared to produce more efficiently in order to meet strong competition. One of the things they must do in order to accomplish this it to procure new high speed machines or modernize existing machines through new drives and controls.

Another major factor in any company's success in meeting competitive conditions is its ability to keep productive machinery in continuous operation with a minimum amount of

Industrial Cut Gears

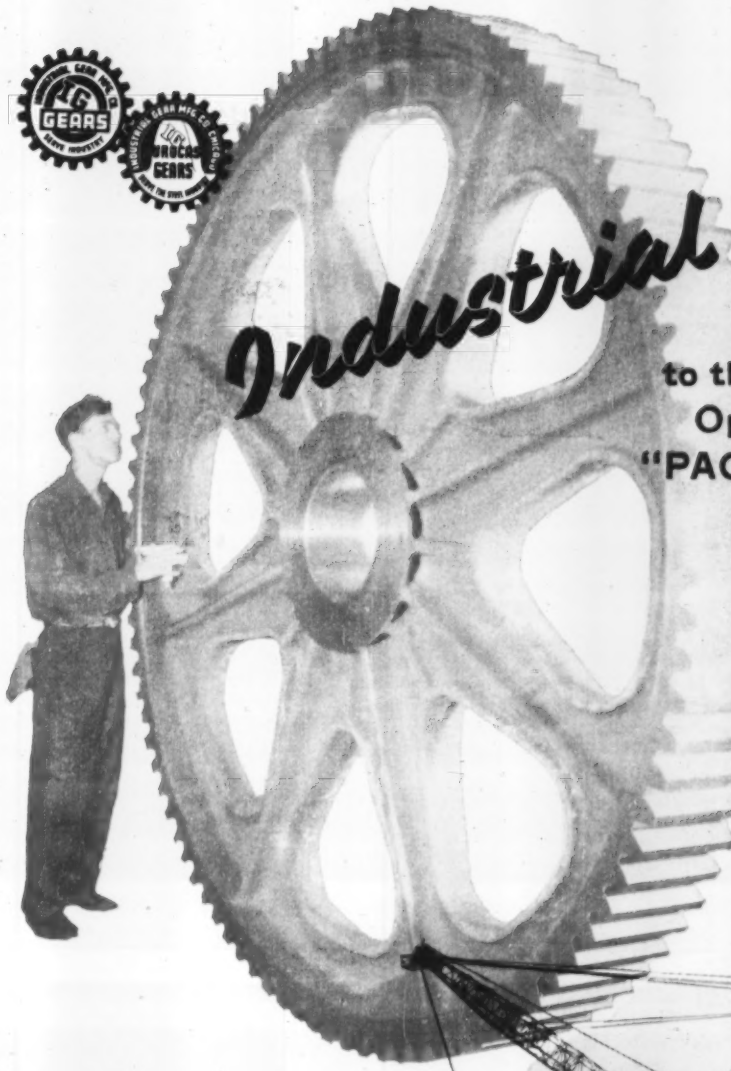
Contribute Vitally to the Dependable Operation of this Huge "PAGE" Walking Dragline

Huge—yes! Page Walking Draglines are as big as a five room bungalow with booms of 185 to 200 feet long to swing and hoist buckets up to 16 cu. yd. capacity.

Powered by Page Diesel Engines—Industrial Gears are used in the swing motor assemblies, hoist and load drum bed assemblies and other vital components.

Heavy-duty is a must for all operating parts — break-downs in remote regions of operation must be guarded against.

"I-G" DUROCASE GEARS and "I-G" GEARS in the specifications are basic. Why not put them to work on your equipment.



If you would like to see our plant at work pictorially, write for Bulletin 152-A. Our entire production is devoted exclusively to Gear and Sprocket cutting. We have no side lines.

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4343 W. VAN BUREN ST.
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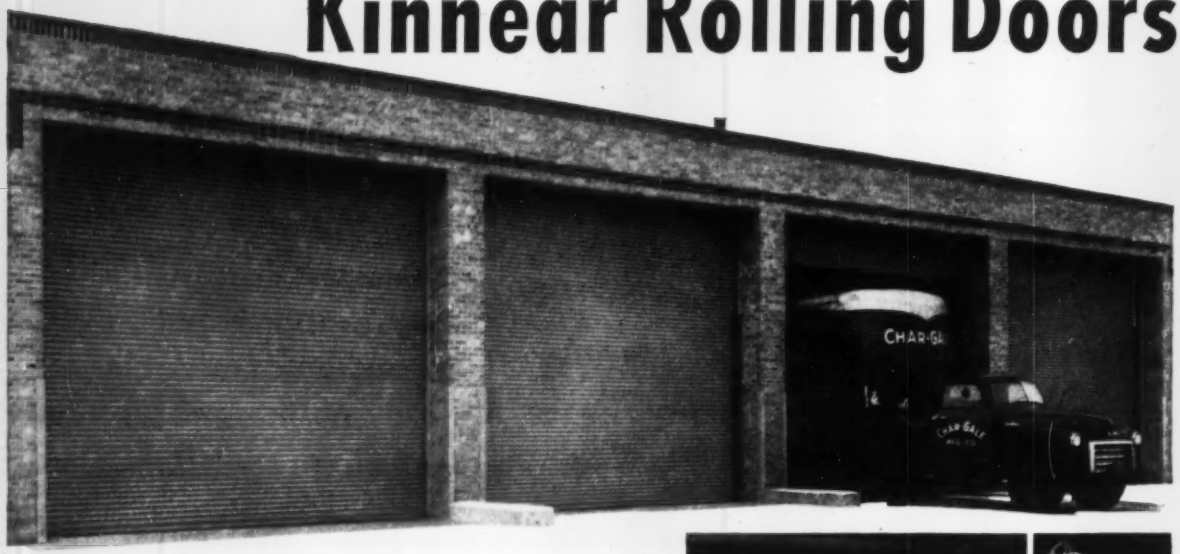
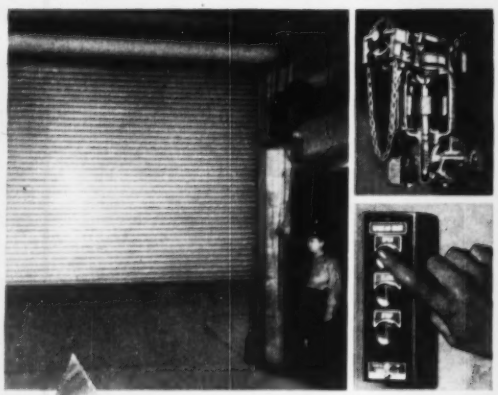
Kinnear Rolling Doors



The *only* type of door with all these COST-CUTTING FEATURES

All overhead space remains clear for hoist, crane, conveyor equipment or other superstructure with Kinnear Rolling Doors. No floor space is lost on either side of a Kinnear Rolling Door . . . since they open straight upward. Light from overhead fixtures is never obstructed . . . Kinnear Rolling Doors coil compactly, directly over door lintel. Edges of steel curtain are locked securely in tracks from floor to lintel, insuring a secure closure and providing extra protection against fire, the elements or intrusion. Kinnear's smooth upward action is ideally suited to time-saving motor operation. Kinnear Motor Operators do the job. Low maintenance cost . . . Kinnear's interlocking steel slat curtain lasts longer, but permits individual slats to be replaced if accidentally damaged.



Kinnear Steel Rolling and ROL-TOP Doors are heavily galvanized as per A.S.T.M. standards to provide a long-lasting weather-resistant surface. Special Kinnear paint bond provides for easy painting and complete paint adhesion.

KINNEAR Steel RōL-TOP DOORS

Kinnear Steel RŌL-TOP doors of strong, all-metal sections combine the advantages of space-saving upward action with easy adaptability for use with glass. Any number of sections may be designed to provide for glass lights of any size. Kinnear RŌL-TOP Doors open smoothly and easily on ball bearing rollers, and are built in a full range of sizes for manual, chain or motor operation.

The KINNEAR Manufacturing Co.

FACTORIES: 1780-1800 Fields Ave., Columbus 16, Ohio
1742 Yosemite Ave., San Francisco 24, California

Offices and Agents in All Principal Cities

KINNEAR
ROLLING DOORS
Saving Ways in Doorways

THORN L. MAYES
Manager, Small Integral Motor Dept.
General Electric Co., Ft. Wayne, Ind.

maintenance repairs. In this regard, drives, usually consisting of the prime mover, clutch, brake and controls, are a vital component.

As one company furnishing such components, we are planning our operations with this in mind: Continued assistance to manufacturers to produce higher speed machines and an increasing emphasis on a complete sales-engineering and installation service of products to users of steel processing and fabricating equipment.

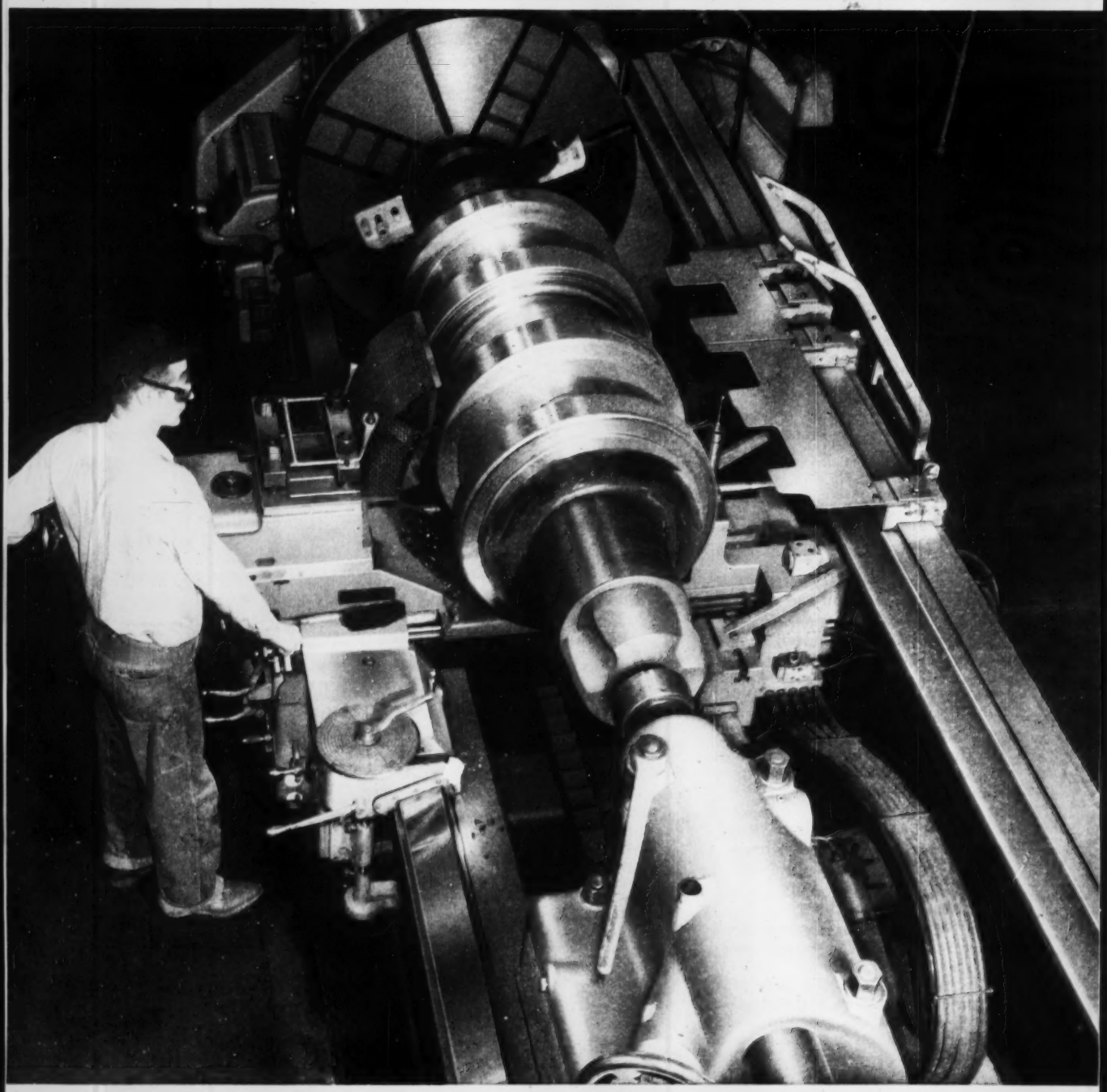
☑ Mr. Mayes

Today, in the metal-working industry, there is a definite trend toward smaller, more compact equipment. Machine tools are designed in smaller, more powerful and versatile models to reduce floor space.

NEMA, by its motor re-rating program, is keeping pace with technological progress in the metal-working industry. The original equipment manufacturers—machine tools, heating and ventilating and pumps—are all most interested in smaller, more compact motors because of appearance, size, cost and weight of their finished products are essential considerations. And in foundries some of our machines are vitally important because some motors weigh as much as the machine itself.

How about the user? Well, the NEMA motor re-rating program offers new opportunities to reduce floor space and other benefits are passed on directly to him—in the form of more compact machines, better overall appearance, and less weight, too—all reducing installation time and expense. Right away, more horsepower for size, more horsepower per pound, pays off in lower handling and storage costs, more economical mounting platforms, easier installation and maintenance.

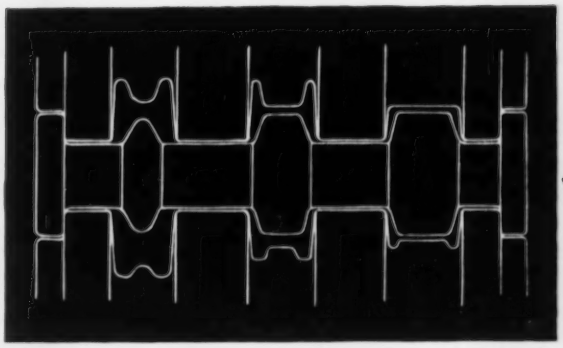
LeBlond Lathe eases cost squeeze ...on rolls that



A set of Shape rolls of 30½" dia. x 51" body cast alloy semi-steel are turned to .005" tolerance in 94 hours on this 50" LeBlond® Roll Contouring Lathe. Set-up time ¾ hour. Clamped-on and brazed-on carbide tips are used at 48 rpm, .040 ipr feed. Conventional roll lathe took 245 hours for the same set of rolls.

squeeze channels from blooms

U. S. Steel Lops 151 Hours Off 245-Hour Roll-Turning Job.



Typical roughing rolls for 8" channel

Every day at U. S. Steel's Clairton Works, Clairton, Pa., miles of "hotter-than-orange" steel are squeezed through the passes of rolls like these for reduction, elongation, shaping. They come out as finished structural steel for the "jungle-gym" frameworks of modern buildings. Turning these costly shape rolls with their steep-angle contours used to keep a lathe running *245 hours on a set of roughing rolls* at U. S. Steel. Tool life was short and the job required highly skilled operators. Stepped-up schedules called for a new solution to this tough-nut production problem.

A LeBlond 50" Roll Contouring Lathe, as recommended by Pittsburgh Distributor, Barney Machinery Co., immediately slashed the 245-hour turning time by an astonishing 61.7%. Now U. S. Steel *saves 151 hours on one set of roughing rolls*—more than enough time to turn out two more just like it. Tool life is greatly improved and less experienced operators can handle the work.

The 50" LeBlond Roll Contouring Lathe is equipped with two-directional hydraulic tracing. A single valve automatically controls two hydraulic motors for cross and length feed. A stylus follows a flat template mounted at the back of the lathe. Feed and speed can be varied during a cut without leaving a tool mark. For roughing, hydraulic cross feed can be by-passed and length feed used separately. This enables operator to cross feed manually, use template as length stop. Mechanical power rapid traverse to carriage and cross slide is also provided. All controls are located conveniently at the apron. The lathe uses a 40 constant horsepower DC motor, has nine speed changes in the headstock, delivers infinitely variable speeds from 1 to 165 rpm.

Whether your turning jobs involve specialized production like roll-turning, or call for high precision, high production—investigate LeBlond's complete line of 76 lathe models. LeBlond engineers will help you get a better turning job, faster. Write today or see your nearby LeBlond Distributor.

Ask for complete information on Roll Contouring Lathes in 25", 32", 40" and 50" sizes.

Turned faster by

LEBLOND *of Cincinnati*

THE R. K. LEBLOND MACHINE TOOL COMPANY, CINCINNATI 8, OHIO

WORLD'S LARGEST BUILDER OF A COMPLETE LINE OF LATHES • *FOR MORE THAN 66 YEARS*

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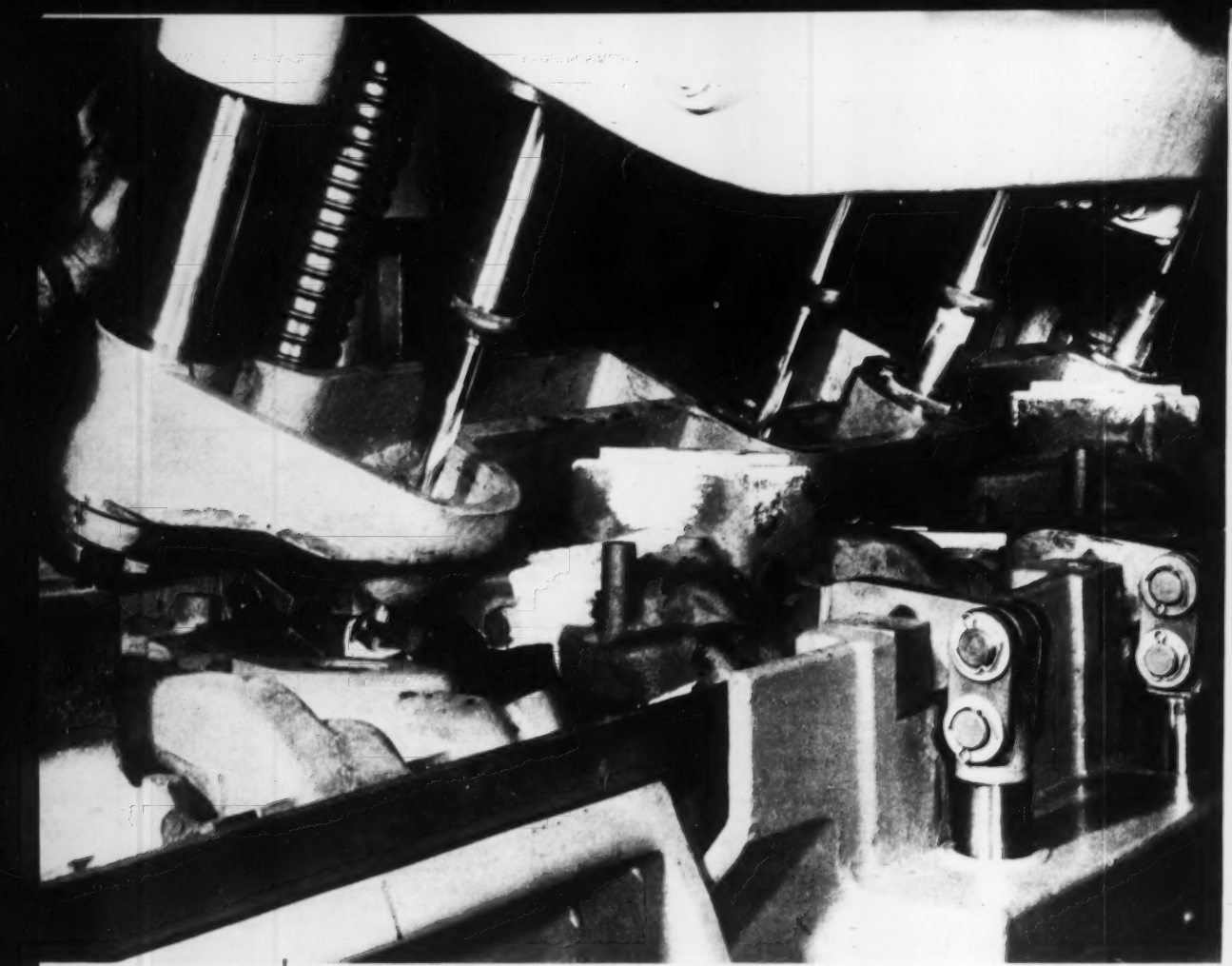

TECHNICAL PROGRESS

Machining

AUTOMATION, which had its genesis in machining, is still the trend to watch. While it will flex its muscles in other directions, automation and machining will be even better partners in 1954. New control systems, gaging methods, work-banking devices and others will get automation's foot in the door of many plants which 'till now have been slightly skeptical.

Not to be forgotten, though, is the standard machine tool and its work. Automation still won't be an across-the-board deal, and the metalworking men who use standard machines are in for some favored treatment. Builders will redesign for higher speeds, higher horsepower, greater rigidity. Expect wider adaptation of tracer control and more and better automatic loading and clamping devices where applicable.

Part of the renovation in standard machines will be due to new, tough-to-cut metals; part to trend toward super-speed machining; and part to competitive days ahead for the machine tool builders.

Coated-abrasive grinding will expand this year as the industry, past the growing-pain stage, looks for new jobs to conquer. Electro-erosive machining methods will be used increasingly where intricate shapes must be cut in hard metals.

Super-speed machining is out of the laboratory and taking its place in production. Nearly every machining method will take advantage of the possibilities of faster metal removal.

Mr. Colwell

Many developments in machining techniques are taking place concurrently. At least two have assumed significant proportions during the past year. The first of these is in the area of automation leading to the ultimate goal of the automatic factory. Many automatic machines and allied auxiliary equipment have been installed during the past year. This activity can be expected to increase and to extend almost indefinitely.

One feature of this activity has not yet been developed very extensively. This lies in the area of instrumentation. So far, most of the machines have been automatic to the extent that they continue operation until tool breakage or some other phase of automatic inspection forces stoppage. One manufacturer features a central indicating panel which simply counts the number of each operations performed and indicates when tools should be changed, based on previous experience.

It will not be long before tool holders and similar devices will become available which can give continuous indication of cutting tool condition as it actually develops. These devices will be used for several purposes such as to give warning of premature tool breakdown; to initiate appropriate adjustments of size, cutting speed, size of cut, etc.; to control parts of a cycle and even to shut down a machine prior to ultimate tool failure.

Mr. Johnson

Industry is becoming more and more finish conscious. Many of our lathe customers now specify their finish-machined surfaces in terms of microinches. On taper turning there is increased interest in special motor controls for the spindle to provide a more constant cutting speed and a better finish.

In balancing one of our strong selling points has been the use of half bearings in our machine to support the rotating workpiece. In Superfinishing we find both inquiries and orders to be good. That in itself indicates to us that industry is anxious to get the best possible finish on bearing journals, oil seals, and the like. At the Brussel's Exposition there was considerable interest in our lathe demonstration where we Superfinish a turned surface on the same machine.

Mr. Connor

Trend toward automation is gaining in momentum as certain obstacles of servicing are being overcome. Ingenious combinations and adaptations of machines and machining processes are revealing new possibilities, raising new problems. But most important, the answers are coming up faster than the problems.

Prewar machines and methods are already obsolete as far as the production line is concerned. The human element, considered from the standpoint both of physical labor and committable errors, is being minimized. Close tolerances at high production rates are becoming the expected thing rather than elusive goals.

All these factors are cutting down on delays in the process of manufacture and, combined with high production machinery, are putting chief emphasis on the lowest cost per unit produced.

Whether it's called automation or economation or anyothermation, our own experience in the building of high-precision production honing equipment gives us first-hand evidence of this increasing need for automatically-operated machine tools.

Recent example in this respect is our automatic Microhoner designed for the honing of small pinion gears. Automatic features include: Parts loading from hopper to feeder track; self-feeding, locating and clamping; abrasive feedout; sizing; segregation of oversized or undersized parts. Automatic shutoff occurs when supply of parts is exhausted or abrasive in the tool is worn out.

Mr. Newton

Trend toward higher speeds in single-point machining continues. With improved carbide tools, optimum machining speeds of 300 to 400 feet per minute are sometimes possible. Experience has also proved that carbide tools can frequently be effectively used at slower speeds where the top speed of the machine is limited. For machining hard materials or castings with sand inclusions, increased tool life can be achieved without sacrificing feed rates.

Another significant development is the increased use of magnetic chucks for holding work in planing or milling operations. Recent improvements in magnetic holding equipment make use of magnetic chucks feasible for a variety of flat and contour work, at a considerable

L. V. COLWELL

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KIRKE W. CONNOR

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GEORGE H. JOHNSON

President, Gisholt Machine Co., Madison, Wis.

HENRY R. MERRILL
Industrial Sales Manager, Behr-Manning Corp., Troy, N. Y.

RALPH E. CROSS
Executive Vice President, Cross Co. Detroit

FREDERICK V. GEIER
President, Cincinnati Milling Machine Co. Cincinnati

H. H. WHITMORE
Treasurer & General Manager, Jones & Lamson Machine Co., Springfield, Vt.

reduction in the total setup time.

Considerable research work is being done on jet or spray type coolants. Jet coolants are efficient and eliminate the necessity for guards and disposal systems. For rapidly reciprocating tables, coolant systems of this type can solve many problems.

☑ Mr. Merrill

The coated abrasive industry is approaching the most productive period of its existence. In 1954 more jobs will be done more efficiently than ever before with sandpaper, because the potential of mechanized sanding methods is maturing into established production techniques.

Last year's experimental coated abrasive machines are this year's standard models. The metal fabricator no longer must design his own Rube Goldberg belt grinder but can select and order standard equipment, engineered for his specific needs, from machinery catalogs. Extensive engineering services for designing specific abrasive sanding equipment to bring polishing problems to full automation are available to industry.

Today's production with coated abrasives reflects not only the vast stride in machinery design but also the improvements in the coated abrasive products. Such things as the heat-resistant resin bonds have opened the door to high production surface speeds. Stronger, yet more flexible, coated abrasive products have been developed for use with shaped and contour contact wheels which make possible the polishing of once impossible contours.

☑ Mr. Cross

New machine tools for mass production industries will be designed to operate without direct labor.

Automatic work banking and handling devices, working in conjunction with automatic programming units, are rapidly eliminating the need for the man at the machine. For example, we now have under construction a new Transfer-matic for V-8 engine blocks that combines 539 operations. It is 346 feet long, handles the part in seven different positions, and has a capacity for machining 100 parts per hour at 100 per cent efficiency.

A little over a year ago such a machine would have been impossible because of the downtime requirements for changing tools. Now downtime is controlled by providing banking stations. Thus only part of the machine is shut down at a time.

Other causes of downtime such as lubrication, chip disposal, inspection, etc., have been eliminated by mechanization. Unpredictable losses resulting from breakdowns have been reduced to a minimum as a result of JIC standardization. In the future machines of this type, and even larger, will operate with as little as 5 per cent lost time.

New developments are leading into subassembly and assembly operations. This will require additional automatic programming to schedule the flow of various parts into the assembly units, also new work handling devices to position and assemble the parts together.

☑ Mr. Whitmore

In the field of metalcutting we are carrying on an active program of education to make the potentialities of carbide tools better understood by the metalworking industry. At the same time, we are playing in the "back room" with newly developed tools which have the potential of greatly outperforming the best tools now commercially available.

We believe that substantial further improvements in machining speeds and tool life are possible in the not-too-distant future.

Ratio of actual cutting time to total work cycle time will be further reduced. This will hasten the need for such things as automatic work handling, faster starting, stopping and speed changing and better chip disposal.

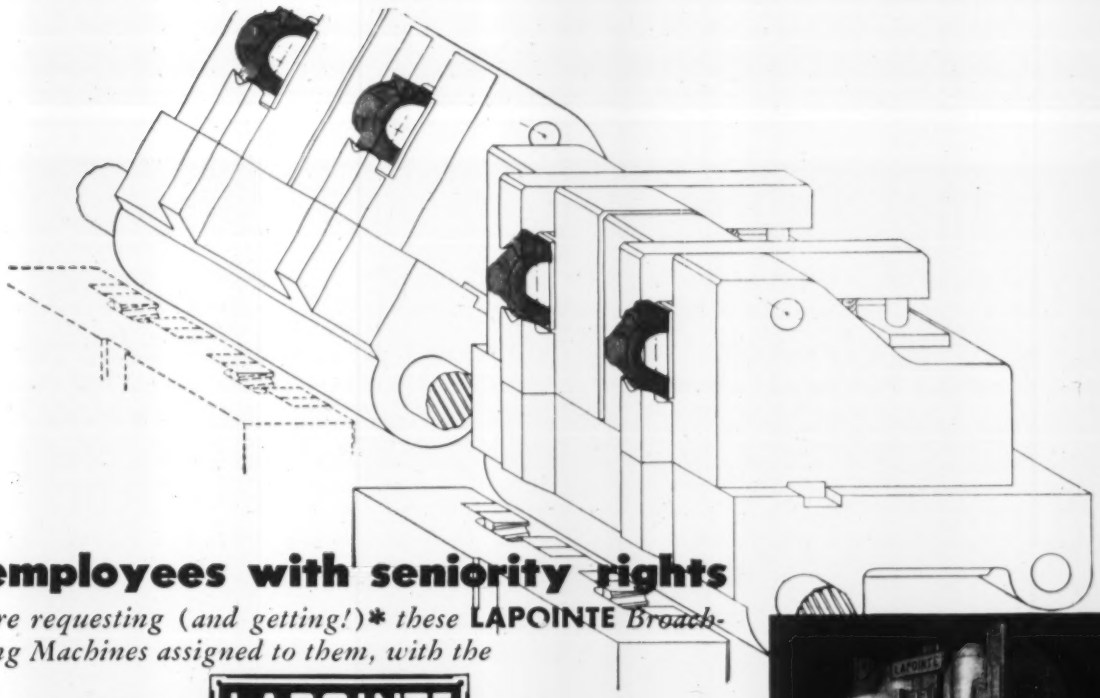
All indirect functions which form a part of the total work cycle must be shortened. Automatic gaging and the use of measurements to feed back corrections in tool positions will become increasingly important.

In grinding the incorporation of automatic devices that control wheel trueing, sizing and infeed permit higher rates of production and greater accuracy. These features, already standard on thread grinders, are being applied to plunge-type cylindrical grinders for form grinding applications. Such machines are destined for more general acceptance because of their increased accuracy and lower unit costs.

☑ Mr. Geier

Two outstanding factors continue to affect the development, application, and purchase of machine tools. One is technological change in both machine tool and user industries. The other stems from industry's continuing desire for lower unit costs. With material prices and wage rates at high levels, the most effective way to lower costs is through replacement of obsolete equipment with advanced design machine tools.

An increasingly large proportion of the machine tools in use today are obsolete in contrast to the more productive, newer designs brought out in recent years. Everyday examples abound in every machining field. Among the more striking examples are the large tracer-con-



employees with seniority rights

are requesting (and getting!) these* **LAPOINTE** *Broaching Machines assigned to them, with the*

exclusive **LAPOINTE**

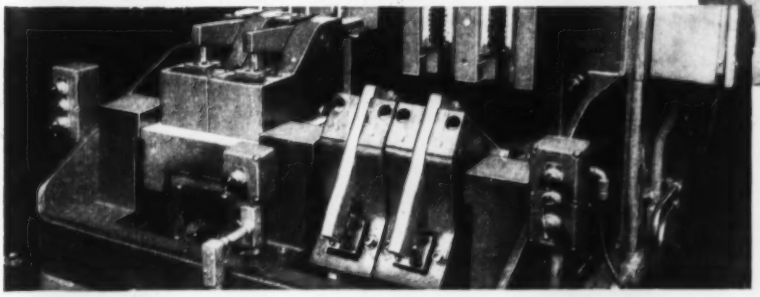
DOUBLE TIP-DOWN FIXTURE

why? *Because they have found these machines so convenient for part handling!*

Here are the reasons: *Fixture tilts down toward the operator*

. . . for safe and convenient handling of parts
. . . in the most natural position
. . . into inclined, unobstructed work nests
. . . already visible and easily accessible without reaching across the machine!

Write for Bulletin **DRV-3**



The **LAPOINTE** Double Tip-Down Fixture operates hydraulically and is electrically interlocked in synchronism with the travel of the broach assemblies, cutting on one ram while the other ram is being loaded.

Straddle broaching the sides of **Automotive Connecting Rod Cap,** removing a maximum of 1/8" of stock per surface from the forging . . . with the **LAPOINTE** 10-ton, 42-inch stroke Double Ram Vertical Surface Broaching Machine. With this machine, even a green operator who had never before run a machine was able to produce 750 parts per hour!

*An actual case! (Name on request.)

LAPOINTE

THE WORLD'S OLDEST AND LARGEST MANUFACTURERS OF BROACHING MACHINES AND BROACHES

EVERETT M. HICKS
Vice President, Norton Co.
Worcester, Mass.

OSCAR L. BARD
President, Michigan Tool Co.
Detroit

E. K. WHEAT
Section Supervisor, Remington
Arms Co. Inc., Ilion, N. Y.

WALTER S. PRAEG
President, National Broach & Machine Co.
Detroit

trolled milling machines, used in milling airframe structural members.

In surface broaching the new machines combine rapid work-handling with reduced machining time based on effective use of carbide insert tools. Automotive cylinder blocks are being broached at speeds up to 200 feet per minute.

There has been growing interest in the higher horsepower standard machines, again indicating the greater use of carbides. And in the field of precision grinding, there have been a number of developments designed to provide more automatic operation.

All these emphasize the productivity and cost advantages of the new machines, and the opportunity for large savings to those users who are installing the newest machines and methods.

Mr. Hicks

There is a bright future for grinding because of the attention and study being given by all manufacturers to reduction in cost and improvement in product. There is a strong trend in metalworking towards elimination of preparatory operations without sacrifice of precision and finish.

New developments contributing to this trend are sintered, die-cast, pressed, or precision-cast materials which permit forming of the part, leaving a small amount of material to be removed by grinding for precise finish size. To handle these materials properly, grinding machine design must recognize the need to receive relatively crude parts to be converted to finished parts with convenient controls for locating, positioning, sizing and rapid production.

Many of our new high-production grinders include automatic work handling, automatic fixtures for orienting the work piece, automatic control of the grinding cycle, use of multiple stations or multiple wheels, together with automatic truing and compensation for wheel wear, and size control to close tolerances. Equally important, the design of these machines must provide for effortless operation and ease of service and maintenance.

Mr. Bard

Perhaps the most significant trend in the production of gears of all sizes is the growing tendency to equip standard machines with automation. Originally, automation equipment was a feature of completely special machinery and the technique as well as the name had its origin in high volume plants.

Now machine tool users in general are taking what could be considered the third step toward greater machining efficiency at lower cost. In the first two steps, efforts were directed at faster machining and reduced loading time. Making loading, machining and transfer to the next operation entirely automatic is a long forward step for users of standardized special purpose machines.

To illustrate this trend, only 5 per cent of one of our Michigan gear shavers were purchased automation-equipped in 1952. By 1953 this percentage climbed to 40 per cent. We have every reason to believe that this trend will continue not only in 1954 but in the following years as well.

Mr. Wheat

American Society of Tool Engineers' survey of obsolete or inadequate equipment or processes being used by industry is the most striking information to be released concerning the metal working industry in a number of post-war years. To realize that more than one-quarter of our present-day equipment and processes are considered obsolete or inadequate by industry is a particularly modern awareness. However, as this situation is the product of technological processes, it cannot be said to be unhealthy as long as real progress is being made to reduce cost and increase production activity.

Our concern would certainly be justified if awareness of obsolescense or inadequacy were non-existent. Many situations involving plans for the future have caused industry to look carefully toward elimination of old processes or replacing equipment. You can't be over-cautious to re-equip or revamp. To take a calculated risk is industry's lifeblood. Such a step will increase productivity at lower costs and can be accomplished by better utilization of materials and processes, discovery of new materials and techniques, and improvement of production tools.

The ability of industry to absorb these improvements will determine whether or not they will survive in the anticipated competitive atmosphere.

Mr. Praeg

The consumer market is growing progressively more quality and cost conscious. Manufacturers generally feel this economic pressure and realize the widespread competitive effort to meet it. Consequently, the most persistent demand on the machine tool builder today is for equipment capable of higher precision and greater production economy. Old standards are obsolete. A fresh approach is imperative. New methods—new designs are in order.

Gear shaving which combines both precision and economy is being more widely applied especially to the very large gears. A giant 180" Red Ring

Taps Without a Name

These nameless taps have been closely controlled at every operation back to where they were cut off as blanks from a steel bar.

They should be, and probably are, perfect, *but* before they earn the right to bear the trade mark GTD they must pass this last test. The one on the lead tester already has passed within the plus or minus five ten-thousandths of an inch specified for one inch length of thread.

It'll do a good job for somebody! Maybe *you!*

Greenfield TAP AND DIE CORPORATION, GREENFIELD, MASSACHUSETTS

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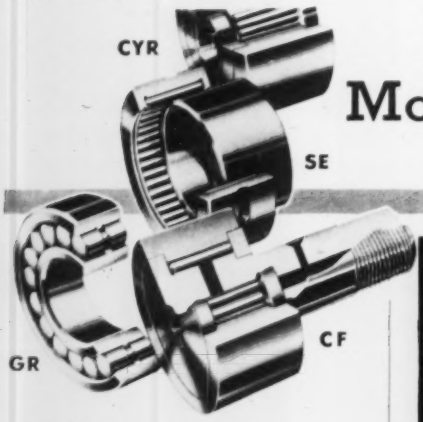
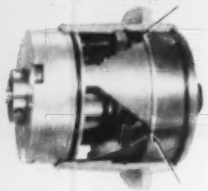
McGILL BEARING BRIEFS

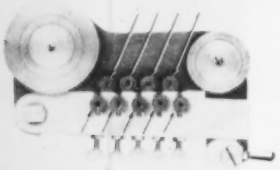


MULTIROL CF BEARINGS PROVIDE POSITIVE CAM ACTION IN ANCHOR CUT-OUT

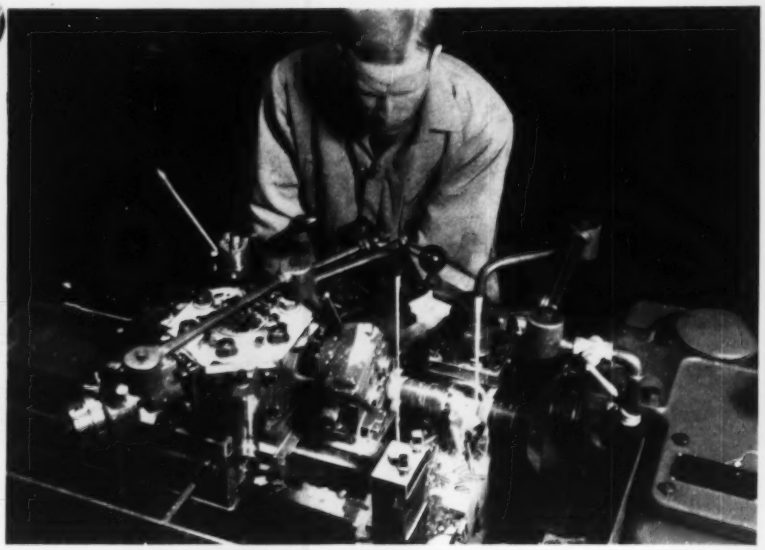


Anchor Steel and Conveyor Company relies on Multirol Cam Follower Bearings for positive and instant operation of Anchor cut-out couplings. When dangerous overload occurs this torque sensitive coupling cuts power when a spring loaded sliding sleeve is actuated by forcing CF series bearings up the inclined faces of a circular cam. Shock load capacity and dependability of CF series bearings combine to help the Anchor Company protect motors and machinery from damage due to overload.

SJOGREN KILLERS CAST WIRE ON MULTIROL CF BEARINGS



On Sjogren Killers for casting wire, Multirol CF bearings with outer races grooved to required wire size have replaced hardened steel rollers. Sjogren maintained required accuracy at much higher casting speeds with minimum of grease instead of objectionable oil lubrication.



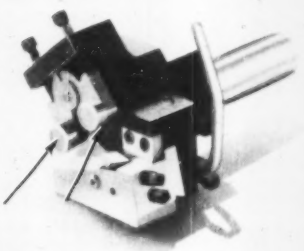
Warner & Swasey Uses MULTIROL® CF Bearings as STEADY REST ROLLERS ON TURRET LATHES

The precision turning done on Warner & Swasey Turret Lathes depends to a great extent on providing adequate, accurate and free turning support for the work in process. The pressure of the cutting tool must be backed up on the end opposite the chuck so that depth of cut and concentricity remains constant.

This support is provided with tool holders using two Multirol Cam Follower bearings as steady rest or bar turning rollers. The precision quality of these rolls is very important to efficient operation. Free turning rolls of adequate capacity will assure work with a smooth finish and a high degree of accuracy.

Warner & Swasey have been using Multirol CF Series bearings in this application for over 15 years. They adopted the McGill bearing after finding its precision quality, resulting from close radial tolerances, ideal to help insure superior lathe performance.

The outer ring of Multirol CF Bearings operates on a full complement of small diameter rollers so the load is



evenly distributed over a greater bearing surface. The inner race and flange are made in a single piece with the stud, preventing any possibility of disassembly. Close tolerance grinding of all bearing surfaces insures greater accuracy throughout longer bearing life and, compared with plain bearings, lubrication is simplified and less critical. Both starting and rolling friction are reduced to a minimum. As a result, internal wear is diminished and power requirements of Multirol bearing equipped machines are cut appreciably.

BEARING SELECTION GUIDE

A new 140-page Bearing Selection Guide, complete with 30 pages of vital engineering data, has been released by the McGill Manufacturing Co. Ask for Catalog No. 52.

McGILL® — Precision Bearings

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President, Kearney & Trecker Corp. Milwaukee

M. EUGENE MERCHANT
Asst. Director of Research, Cincinnati Milling Machine Co., Cincinnati

JOSEPH P. CROSBY
Vice president, Lapointe Machine Tool Co. Hudson, Mass.

horizontal shaving machine, largest of its kind ever built, was completed only 7 months ago. More such units, perhaps even larger, are to follow.

A radically new shaving machine combines all the facilities for both conventional and diagonal shaving together with crowning. Equipped with automatic differential up and down feed for selective cycling, this unit is much faster, is more precise and it assures much longer cutter life.

Soon to be announced is a new internal gear shaving machine which will have a number of features contributing to both precision and economy.

Mr. McDonald

The art of removing metal within the restrictions of presently-known media and presently-known metals which must be machined is progressing rapidly. Much more is known today about the optimum possibilities of tungsten carbide than of the speed at which an individual cutter will remove metal under ordinary conditions. It revolves directly about the point at which the greatest cost-saving in production can be achieved. You may fly a jet at six hundred miles an hour, but if you were going only a hundred miles, the time from your office to the office of your destination might not be appreciably less than that in a conventional airplane. By "greatest cost-saving in production" I mean that the lowest cost per piece, floor to floor, must be the goal. In some forms of machining this means greater automation, but there is an economic limit to this.

Another point involved is the use of horsepower. There are different economic limits imposed by size of motor equipment and by current consumption which have a definite bearing on the cost per piece. These things are gradually evolving in the art of machining metal. Great progress has already been made and great progress is ahead.

Mr. Trecker

Automation is a stirring challenge to industrial America. One hears of it with increasing frequency, especially in the talks and reports of persons attempting to look into the future. From a machine tool manufacturer's view point, automation will be an evolutionary, rather than a revolutionary process.

Automation, by its very necessity, demands mass production and today fully 75 per cent of all machined parts are of such a nature that mass production is not economically required and, thus, the field to which automation can be applied is limited to the remaining 25 per cent. In this 25 per cent lies high volume industry such as automotive, household appliances, clothing and food.

The machine tool industry cannot of itself advance the advent of automation. This has to be done as a co-operative enterprise between the manufacturer of the ultimate production and the machine tool builder.

Great strides have been made in automatic controlled machines, however, a word of caution. You must realize that in many instances the electronics and other control devices necessary to accomplish automation cost far in excess of the machine tool equipment itself, thus, only can mass production industries use automation. We stand ready to do our part, to do the basic research, to work with and advise the manufacturers.

Mr. Merchant

One area of active advance in 1953 was in solution of difficult problems associated with grinding and machining of titanium. As a result of application of findings of basic metalcutting research to improvement of grinding fluids and wheels, it became possible to grind titanium almost as readily as steel, particularly on such operations as internal grinding. In titanium machining, research findings pointed the way to improvements in cutting fluids and tool materials, demonstrating that problems here can be still further eased.

The year also saw increased use of radioactive tools to measure tool wear and tool life rapidly and economically. Application of this method gave quick answers on day-to-day machining and cutting fluid problems.

Application of electro-erosive machining methods to practice forged ahead. Both the electrolytic and the electro-spark methods showed promise in various types of operations.

Economics of machining at high speeds was simplified and clarified. While metal may now be machined at almost any desired speed, there is an optimum speed for any given operation at which the machining cost will be a minimum.

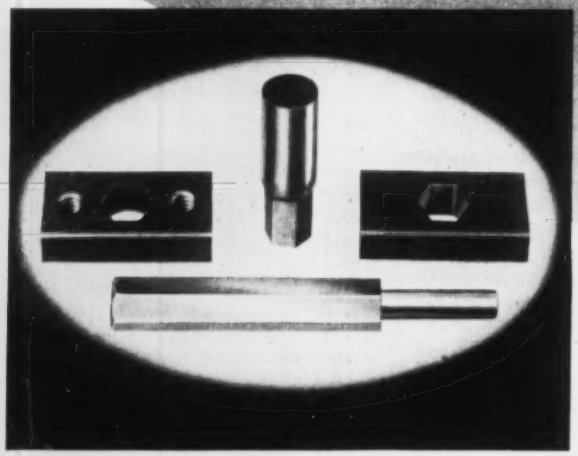
Mr. Crosby

First electro-mechanical drive broaching machines are now in operation, and they more than live up to the original promises. With the machining of newer alloys, we have found the necessity for broaching machines of greater strength and greater speed.

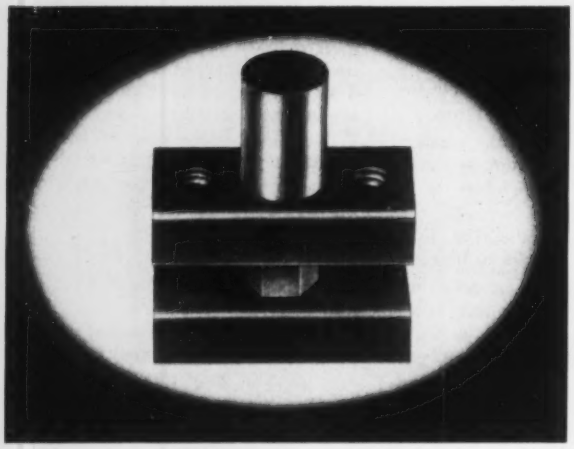
There is no question that the electric drive broaching machine offers elimination of possible chatter plus and smoothness of operation with greater tool life and superior finishes.

It was not until we put the new electric drive broaching machine in use that we discovered the longer

Can You Make This Punch, Die and Stripper Plate Out of Tungsten Carbide for



$35.50*



In Your Plant

Electrode manufacturing time	2 hours
Cutting time on die	½ hour
Cutting time on stripper	½ hour
Cutting time on punch	½ hour
Accumulated setup time	1 hour
TOTAL LABOR TIME:	4½ Hours
Cost of Tungsten Carbide material:	$22.00

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H. P. CHAPLIN
President & Treasurer, Cone Automatic Machine Co. Inc., Windsor, Vt.

ALFRED KULLMAN
Vice President and Works Manager, American Tool Works Co., Cincinnati

HERBERT L. TIGGES
President, N.M.T.B.A., Executive Vice President, Baker Brothers Inc., Toledo

H. GLEN BIXBY
President, Ex-Cell-O Corp. Detroit

tool life in our present high speed steel tools. Rigid construction and smooth drive is undoubtedly the answer to greater wear on the cutting edge of our present high speed broaches.

With the horizontal electric drive broaching machine, we are able to obtain greater lengths than our average factory will allow in vertical broaching machines.

It has been proved in actual production at one of the large aircraft builder's plants that it is possible to broach with conventional high speed steel broaches at much higher speeds than were formerly considered possible or practical.

Compressor discs of AMS 6415 steel, heat treated to 35 to 40 Rockwell were broached at 80 sfm with much better broach life than at the slower speeds. High return speed of 240 sfm reduced the time for the return stroke to less than five seconds.

☑ Mr. Chaplin

Work opportunities provided the multiple spindle automatic lathe in the past, and in the future, can be credited to established production principles. Chief of these is the value of centralized responsibility.

Concentration of machining activity in a given floor space, with benefits of full automaticity, has long been an accepted means of effectively planning the work and working the plan. So much depends on the automatic's ability to follow through that reliable performance is its outstanding qualification.

Increasingly varied demands on the machine make necessary models more specifically designed to excel in certain work classifications. Such a trend requires a larger number of models and a greater investment from any builder who desires to provide the trade with a well rounded line of machines and service. It also requires a more specialized knowledge on the part of the purchaser to insure adequate machine selection.

Most promising opportunity before the automatic is in the field of carbide tools. On the same jobs, and where carbide requirements are met, 100 per cent carbide tool-ups have boosted production to six times that of high speed steel and have increased tool life to ten times. Better finish and closer limits have been accompanying benefits.

☑ Mr. Kullman

Confronted by an inevitable slackening of industrial activity resulting from transition from a war to a peace economy, it becomes increasingly essential for industry to put the payroll dollar to work for greater efficiency and profit.

Likelihood of basic cost factors being materially reduced appears extremely doubtful. Therefore, with order volume declining and overhead taking a bigger bite out of profits, some compensating means must be adopted to prevent profits disappearing completely.

One answer, and perhaps the most effective one, is modernization of plant equipment. This is a subject that has received wide general publicity but rarely is it pinpointed to individual needs. True, the appropriation and expenditure of money during a weakening economy demands management foresight and courage, but it is likewise true that such foresight and courage are the cornerstones of the solid foundation upon which our industrial triumphs have been built. There is overwhelming proof on every side of the benefits accruing from plant modernization for the simple and constructive reason that it places better and more efficient tools in the hands of producers and guarantees a greater return from the payroll dollar.

☑ Mr. Tigges

The machine tool industry is, in my opinion, facing the most strenuous period of research, improvement and re-design it has ever experienced. There are three reasons for this. First, the American machine tool industry has always had to maintain its markets by obsoleting its own product. Also, foreign competition is pressing as never before. Our own U. S. foreign aid program has helped to build competition that is threatening not only our foreign markets but has invaded our own domestic market.

Finally, with permitted depreciation allowances inadequate for replacement of obsolete equipment, there is in our country today a severe tax penalty upon modernization. To overcome this, the machine tool industry must demonstrate sufficient savings in production costs to pay not only for the machine but for the tax penalty as well.

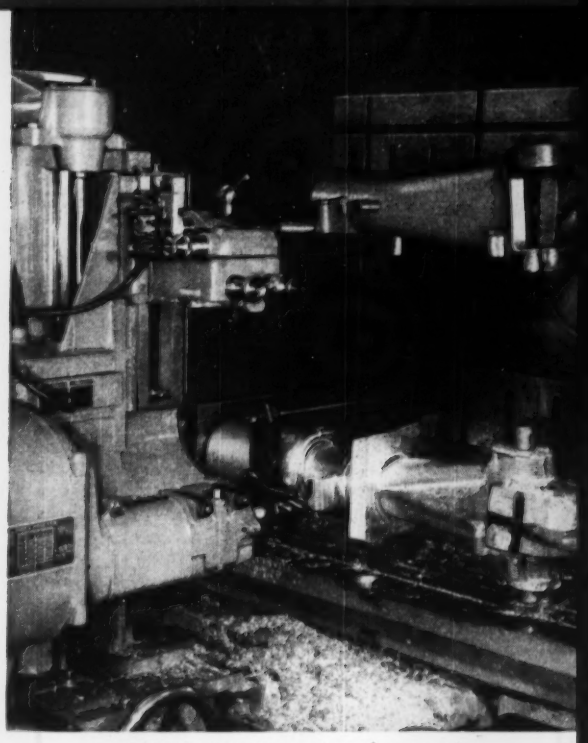
The normal need for product improvement supplemented by the threat of rejuvenated foreign competition will stimulate new design. With the Government penalty on modernization removed, as I am sure it will be, it is my belief that 1954 will prove a banner year in development of designs that will keep the American machine tool industry out front.

☑ Mr. Bixby

In the machine tool field the trend continues toward automation, electronics and tracer controlled mechanisms. These seem to be the recognized avenues to lower production costs. Even on fairly simple machines more and more buyers are asking for automatic features and work handling equipment. Such equipment not

SO MANY JOBS done....

ON A PRATT & WHITNEY TYPE BL KELLER MACHINE because



PROTOTYPE Machining of an experimental aircraft part from a solid billet

"KELLERING" REPRODUCES COMPLEX, IRREGULAR SHAPES FASTER, MORE ECONOMICALLY . . .
"KELLERING" — automatic tracer-controlled milling — easily handles irregular and complex shapes that otherwise would be difficult to machine by any other conventional method. The initial job is done economically, and additional duplicates can be produced at a fraction of the usual time and cost.

KELLERS ARE DESIGNED AND BUILT *SPECIFICALLY* FOR TRACER-CONTROLLED MILLING . . .
not just "adapted." Complete, versatile, powerful and provided with a wide range of spindle speeds, they're ready to take on an unlimited variety of jobs without needing major adaptation by expensive attachments.

THEY'RE RUGGED, DEPENDABLE, STAY ON-THE-JOB . . .
year after year without frequent or expensive maintenance.

HORIZONTAL CONSTRUCTION PROVIDES MAXIMUM STRENGTH, RIGIDITY, EFFICIENCY and CONVENIENCE . . .
workholding and positioning are simplified, and the open side construction places no limitation on the size of the work piece. Chips and coolant fall out of the work cavity, cutting is fast and free, without clogging. Operator always has a complete view of cutter and work. Full push button operation is centralized on a single control panel.

ELECTRIC TRACER CONTROL . . . is dependable, relatively simple and retains its high initial accuracy without frequent maintenance or complicated adjustment. Master forms are duplicated PRECISELY. Machine uses two types of tracer control: ***Profiling*** to a pre-set depth following an outline template; and ***3-Dimensional Milling*** using an inexpensive model as a master.

KELLER TYPE BL IS A VERSATILE, HANDY SIZE MACHINE — JUST RIGHT FOR MANY AVERAGE JOBS IN YOUR SHOP . . .
two standard sizes are available, 24" x 16" and 36" x 20" — both with 8" transverse travel. Both can be furnished as Three-Spindle Machines with 8" or 10" center distances between spindles.

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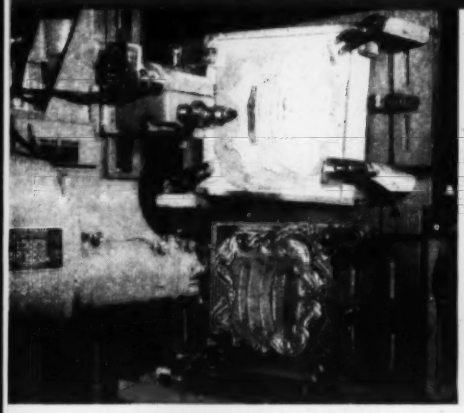
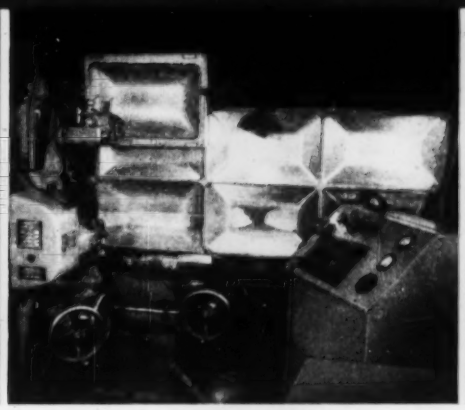
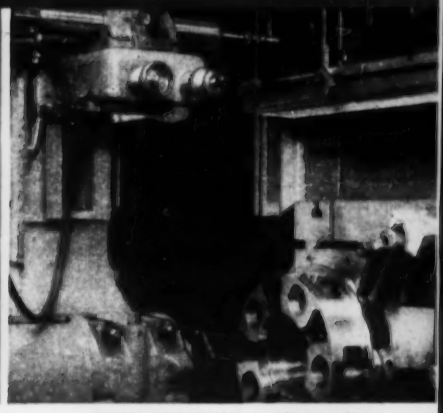


PLASTIC MOLD, intricate 3-dimensional milling from a plaster model



RUBBER MOLDS, six from a single master, for foam rubber pillows

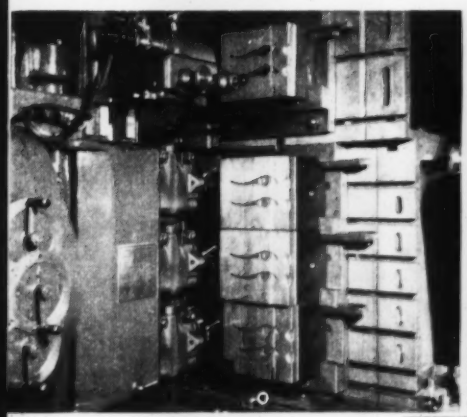


INDEX PROFILING, machining five cavities requires only a single master

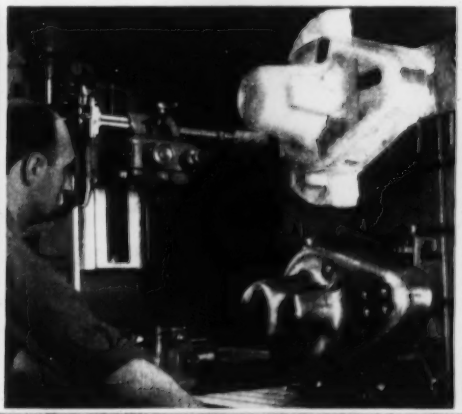
BY TRACER-CONTROLLED MILLING

PLASTIC MOLDS • RUBBER MOLDS • FORGING DIES • METAL FORMING and DRAWING DIES
DIE CASTING DIES • METAL PATTERNS • CAMS • PROTOTYPE WORK • PRODUCTION MILLING
and MANY OTHER JOBS WHERE IRREGULAR SHAPES MUST BE MACHINED

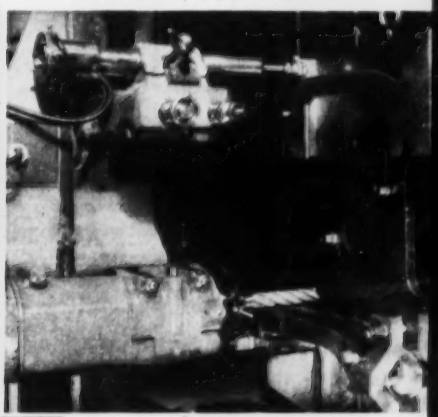
3 FORGING DIES machined simultaneously on a 3-Spindle Keller



DIE CASTING DIE for a power lawn mower motor housing



PRODUCTION MILLING, profiling an aircraft landing gear component



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...FASTER HANDLING, LOWER COST

● Here's how a typical plant turned a slow, costly handling job into a simple push-button operation. Consider the savings you might get in time, money and manpower by following a similar step.

The job was to remove wire from winding drums and convey it to the next operation. To reduce costs, a new idea was tried: a ½-ton, single I-BEAM READING ELECTRIC CRANE was custom-built for the job. All motions were motorized. Now one man controls the entire operation faster and more economically—by simply pushing the right button!

If you, too, are looking for a way to speed up your own materials handling, and save money doing it, here's the step that can pay off for you. Simply get in touch with READING. At no obligation, one of our engineers will gladly analyze your handling requirements and give you a practical recommendation for obtaining the results you want. A note on your letterhead will put him to work.

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READING CRANES

CHAIN HOISTS **OVERHEAD TRAVELING CRANES** **ELECTRIC HOISTS**

ALLAN C. MATTISON
President, Mattison Machine Works
Rockford, Ill.

only reduces operator fatigue, but also eliminates human error and nearly always increases production.

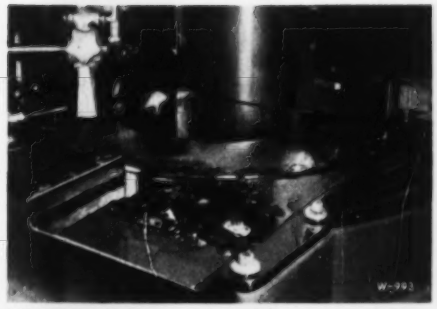
Steady advances are being made in the production machining of tough, heat-resistant metals, such as stainless steels and titanium, especially on parts used in jet aircraft engines. Even extremely hard and brittle substances, such as carbides and cast alloys, are being machined at much higher rates than ever before, and I look for rapid progress along these lines.

In 1954 machine tool builders will do less work for defense and will have a larger percentage of output for the civilian economy. We must ferret out and expose old, inefficient machines, and prove that savings can be made by the purchase of new, more accurate and more productive machines. This is a powerful selling force and the industry will have to make good use of it to maintain the volume of business it is geared to handle. No doubt the future will bring better deliveries and more normal competitive conditions.

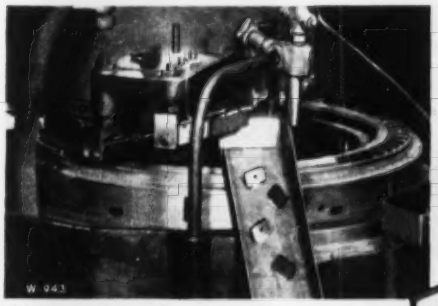
☑ Mr. Mattison

Increasing popularity of the newer alloys which are hard to machine, plus the accuracy and improved finish which can be obtained by one setup, on one piece of equipment, by one operator, is leading process engineers and methods engineers to design or redesign existing parts making them applicable for grinding. As a result many manufacturers are changing from rough and semifinish operations with cutting tools to grinding castings and forgings from the rough to the finished product in one setup.

Others are redesigning to eliminate parts which have projections

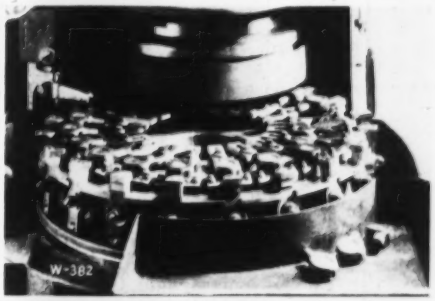


4360 surfaces per hour!



2000 surfaces per hour!

940 surfaces per hour!



900 surfaces per hour!

1400 surfaces per hour!

FIELD REPORT:

... a Blanchard No. 16-A Surface Grinder saved them $39,000 in 2½ years! (cost approx. $12,500) Their order follows for a Blanchard No. 16-A2!

Here's proof of performance and proof of satisfaction, yet typical of what users expect *and get* from the Blanchard 16-A Surface Grinder. Several typical examples of production rates are shown here. Above, for instance, .003" of stock is being removed from one side of small gears to a tolerance of ±.001" *at a rate of 2100 per hour!* This machine has a 30" chuck and a Blanchard Demagnetizer.

The No. 16-A grinds continuously with a wheel that is set and automatically maintained at a fixed height above chuck face, and finishes one surface of the work to size in one pass under wheel. Operator has only to load the work on the magnetic chuck or in an automatic clamping fixture. A wheel control automatically feeds the head down to compensate for wheel wear. Unloading is usually automatic. Attachments can be supplied for demagnetizing and washing the work as it leaves the grinder. On most work, limits of ±.0005" are readily maintained.

The No. 16-A2 (not shown) has two wheels, each with automatic size control. It roughs and finishes one surface of the work in one pass through the machine.

Send for your free copies of "Work Done on the Blanchard", fourth edition, and "Art of Blanchard Surface Grinding".

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THE BLANCHARD MACHINE CO.

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JEROME A. RATERMAN
President, Monarch Machine Tool Co.
Sidney, O.

ARVID LUNDELL
President, Colonial Broach Co.
Detroit

that cause wheel interference on flat surface grinding so they may take advantage of production grinding as a faster method of finishing.

The increasing accuracy demanded by industry, both in flatness and in size, is another step in getting more and better goods to more people. The years ahead will offer a constant challenge to our engineering and constructive ingenuity to meet the demand for even better finish and closer accuracy on the harder and tougher materials constantly coming into use. With these demands will come the necessity for simplification of machine operation and production control to enable operators to meet increasingly exacting requirements.

Mr. Raterman

Recent developments in metalcutting and in machine design reveal a trend toward higher cutting, extended use of contouring equipment, increased machine rigidity and greater flexibility in our production machines.

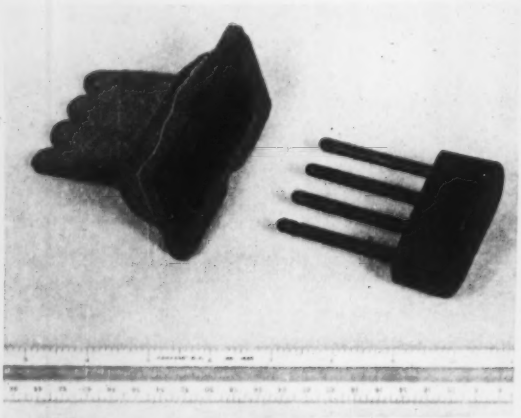
In the past few years there has been an extraordinary advance in the application of tracer-controlled lathes to both small and large job lots. These single-point, tracer-controlled machines offer low tooling costs, high production rates and extreme accuracy. Most of these machines are equipped with automatic cycling and have a wide range of preselected speeds and feeds.

Looking ahead, the lathes of tomorrow will be better styled, have increased power, higher spindle speeds, rapid traverse, tracer equipment, and automatic loading devices. Electronic controls and hydraulic actuating units will greatly ease the effort required to operate these machines.

Most buyers will want their machines completely tooled, geared for high production and designed to machine the increasing number of new materials which are being developed. Some critics will claim they are too costly and are over-equipped, but in general I believe we can look forward to functional machine tools designed to do a wide range of jobs at higher surface speeds and a lower cost per piece.

Mr. Lundell

These two facts stand out in broaching: Surface broaching is becoming more and more widely accepted, broaching operations integra-



NEW

Spectroshell molds for Spectrographic pin samples

APPLICATION: Each mold produces 4-4¼" sample pins for use on ferrous and nonferrous applications. Mold body can be used for chemical analysis.

ADVANTAGES: Improved sample homogeneity and permeability. Elimination of fins, sharp edges, piping, porosity and other sample imperfections. Precision molded samples require no machining of cylindrical surfaces. Mold maintenance is eliminated.

PRICES: $18. per box, in box lots of 50 and up. Sample box order of 1 box, $21.60. f.o.b. Cambridge, delivery 30 days after receipt of order. Mold packed 180 per box.

BETTER BA ANALYSIS

Baird Associates, Inc.

33 UNIVERSITY ROAD CAMBRIDGE 38, MASS.

ted into the production line produce major economies for the user. While internal broaching machine purchases hold at a relatively steady rate surface broaching machines are expanding their sphere of influence at a rapid rate, according to Department of Commerce figures.

Advances in machine design, fixtures, know-how and the broaches themselves all contribute to the increase. The fact that many of the new jobs where surface broaching is being applied with great success are those requiring a high degree of precision, indicates that many additional applications are in prospect for the future.

To gain maximum benefit from improvements in broaching equipment and techniques requires a practical approach to the manufacturing problem. The broaching machine, its location in the production line, the fixtures required and the broaches themselves are all a part of a common problem that should be solved at the same time.

We, at Colonial, call this single responsibility for design, manufacturing and installation of complete broaching equipment, "Unified Broaching." This approach to a manufacturing problem enables the parts to be handled quickly, means the parts are accurately machined and properly finished with fewer operations in a smaller plant area.

Mr. Arms

One of the most important developments in grinding is the refinement of automatic size control used for terminating the grinding operation plus the application of checking devices to grinding machines to shut down a machine producing work not meeting standards of quality. This is important where an operator is responsible for two or more high-production automatic machines to prevent turning out large quantities of work outside the tolerance.

Grinders of shoe-type centerless design are being used increasingly for grinding both internal and external surfaces. Several ball and roller bearing manufacturers have installed them to obtain more uniform wall thickness and raceways in better relation to faces.

Work is supported on two shoes spaced in relation to the point of grinding wheel contact and is held axially against a rotating face plate which drives the work and holds it in square with its axis. Work may be supported by shoes bearing against outside surface for grinding either outside or inside; or it may be supported by shoes bearing against the previously ground hole for grinding the outside.

Introduction of titanium as a commercial material presents new problems to manufacturers of grinding machines, grinding wheels and coolants. Considerable research is being carried on to determine methods for removing stock more rapidly and improving finish when grinding this material.

Practice of grinding ways of machine tools and other machines is becoming more common.

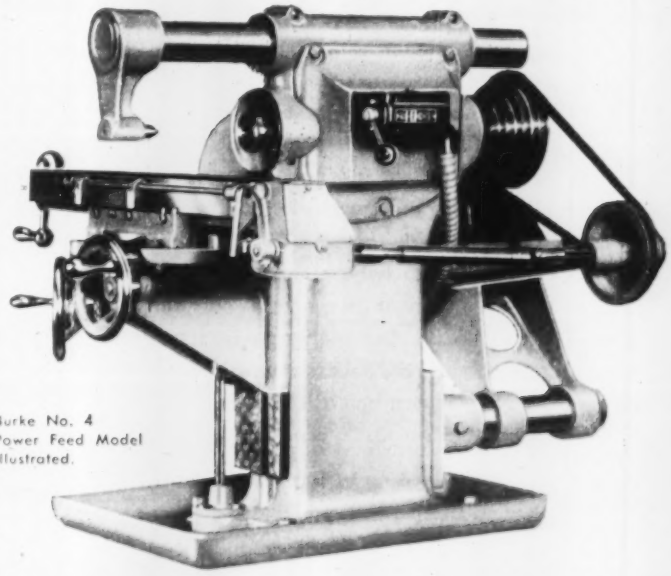
As closer tolerances and finer fin-

M. H. ARMS
Chief Engineer, Bryant Chucking Grinder Co., Springfield, Vt.

IT'S AMAZING

what these little rascals can do!

That's why Burke Bench Millers are a big favorite in thousands of tool, school, development, repair and mass production shops.



Burke No. 4 Power Feed Model Illustrated.

BURKE Bench Millers

— are so rugged, accurate and versatile they can practically reproduce themselves!

Send for complete data on models, specifications and full line of attachments.

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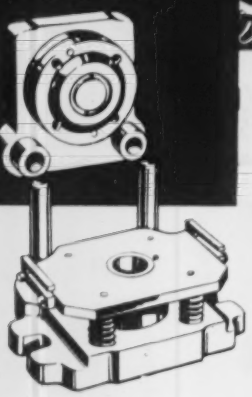
IT TAKES MORE THAN DIES



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It's the "know how" of nearly 40 years of production stamping service that counts. De-Sta-Co's main stamping plant is especially geared for production runs of light to medium-heavy fabrication, up to 3/8". Our bed areas range from 10" to 12" to 48" x 72", pressures from 5 to 250 tons. We draw up to 4" deep. During the years we have built up an impressive record in coining operations, our knuckle-action presses handling up to 400-ton capacity. The diversification of our equipment means your job runs on the most efficient press. Our highly mechanized material handling system saves dollars for you, helps us to keep our delivery record one of the best in the business. That's why "De-Sta-Co" means "Integrity".

For quotation send a sample part if possible, with a drawing, specifications, and quantity required. You'll get a prompt reply.

Another De-Sta-Co specialty is the *high*-volume production of small, intricate parts, from a blank size within 2½" x 12½". Whatever your stamping problem is, hand it to the house with over two-score years stamping experience.

Send for our Stamping Brochure illustrating our production facilities.

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DETROIT STAMPING COMPANY

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RALPH J. KRAUT
President, Giddings & Lewis Machine Tool Co., Fond du Lac, Wis.

ish are demanded there is increasing recognition of the importance of maintaining correct alignment of grinding machine components.

Mr. Kraut

The aviation industry has posed, along with the conventional machining requirements, more specialized problems concerned with the geometric requirements created by extending of primary structural elements to the external airplane contours.

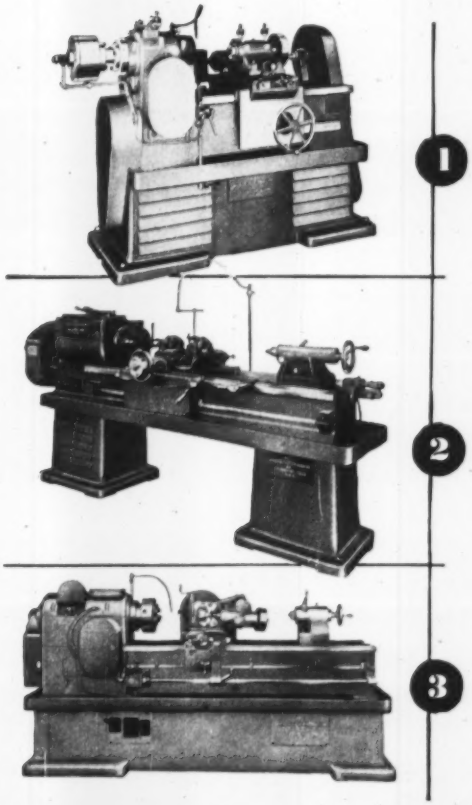
Metals involved here are the high-strength aluminum and steel alloys. In the near future, specifications will call for titanium alloys for structural material as aircraft speeds approach the heat barrier.

Present-day manufacturing trends are constantly increasing the requirements of machining. A well-known airplane which had a designed gross load of 75,000 pounds a few years ago, has increased its load-carrying capacity to 140,000 pounds on the present model. Many primary structural fittings, made of steel due to space limitations, have never been changed in design so far as their physical configuration. Only change has been in the specified steel alloy and its heat treatment. Parts formerly specified in the 150,000 psi range are currently specified at 240,000 psi. Present experiments in machining include steel alloys of 300,000 psi.

As one of the major contributors of heavy-duty machinery to solve the complex machining problems of the aircraft industry, we have consistently been improving the rigidity of this machinery and are offering ranges of feeds and speeds to meet more exacting machining requirements, plus automatic control devices capable of machining complex configurations required in present and future aircraft.

If it has to be precision THREADED ...a COULTER will do it faster, more accurately!

With a reliable COULTER Automatic Threading Machine on your line, you will hold your share of today's speed-up-of-production demands! You will thread parts in a greater variety of lengths and diameters with diverse materials to more accurate specifications and far better quality than with any other threading machine built . . . and everything is automatic!



3 models for Varying Threading Operations:

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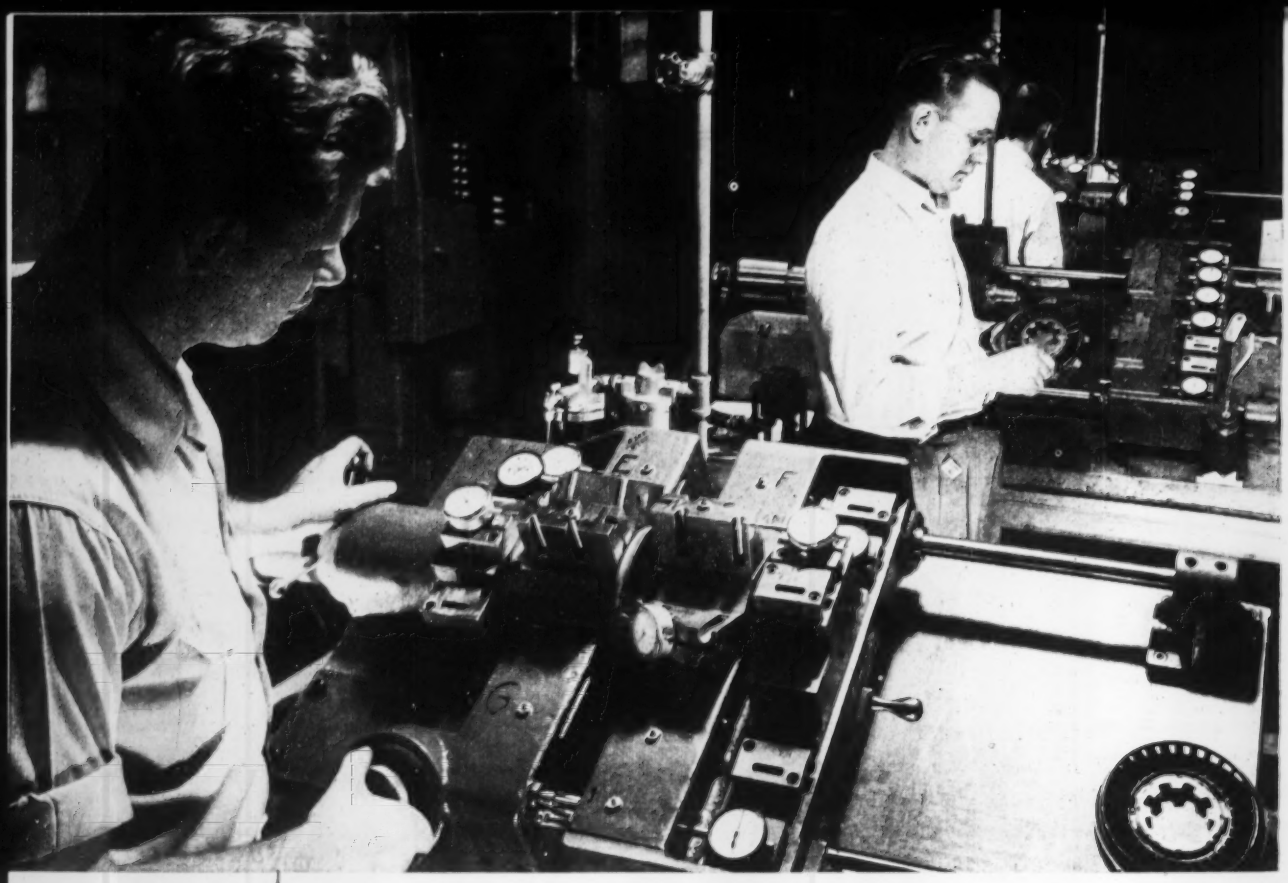

TECHNICAL PROGRESS

Tooling and Gaging

TOOL AND GAGE engineer bids fair to be a star performer in the drive to lower production costs. His decisions can spell profit or loss and often put a possible or not-possible tag on the product.

Emphasis on cutting fluids will rise in direct proportion to the boost in production requirements. New tough-to-machine metals also will force more metalworking men to take a closer look at cutting fluids than ever before. Soluble oils will handle a large part of the tougher machining jobs to come, because the cooling ability is a must for the high temperatures generated in high speed-hard material machining.

Gaging is moving out of the inspection department and into the machine shop. Automatic gaging methods check workpieces as they are being processed. Even the hand gaging devices have been simplified, at least from the operator's standpoint, until complicated readings can be made easily and rapidly by the machine operator. Result—virtual elimination of a separate operation. Electronics and air are due to take big strides in development of gages and sorting equipment.

Carbides will be used even more as a result of new techniques. Plastics will grow rapidly in stature as inexpensive, long-lived, easy-to-make tools and dies. Life of plastic dies has improved radically—a most important factor in their acceptance. At the same time advances in metallurgy plus better heat treating will widen the range of utility of almost all tool steels.

Mr. Larson

Ever since the introduction of carbide cutting tools, soluble oils have been on the increase. The carbide cutting tools need water coolants, and this cooling effect is afforded by soluble oils.

Soluble oils are best suited to rough cuts and the cutting oils are used for finish. To increase the severity and use-range of operations, EP soluble oils were introduced. Recently, the development of more potent EP soluble oils made it possible to handle medium and heavy-duty cutting operations, severe broaching and better finish of steels, where formerly lard-active-sulfur, cutting oils were recommended. This broadening range of application, through these more potent EP soluble oils, also assures lessening of the fire hazard, especially in large plant operation, where machines are hooked up to a single supply system.

More attention is being given to machine-tool bearing design, through oil seals, so leakage from the machine-tool lubrication system into the cutting fluid system is held to a minimum and the bearings are not adversely affected by the soluble oils.

Sulphur and chlorine-containing cutting oils are also gaining favor because they are particularly suitable for moderately severe operations on hard cutting stock, and at low cost. Outstanding ones are noncorrosive, transparent cutting oils which combine unusual additive stability with good antiweld and extreme pressure characteristics. The heavier grades also may be recommended where it is desirable to have a single fluid serve both cutting and lubrication purposes.

Mr. Boyd

Much higher machining speeds will result from new developments in cutting fluids. These lubricants will be related or selected according to the metal structure being machined. For instance, in the broaching of heat resistant jet alloys, speeds of 15 surface feet per minute have been increased to 60 sfm and above. This increase in speed has also been accomplished with a 25 per cent increase in tool life.

Development of higher speeds will place the emphasis on cooling and penetration. In some cases, for instance in automatic screw machines, this will mean a switch from straight oil lubricants to extreme pressure water soluble lubricants that increase the cooling efficiency and at the same time maintain desirable lubricating features.

Emphasis on higher speed will also require the conversion of dry operations to the use of cutting fluids. In the case of machining operations on extremely large parts, this will require the addition of a mist applicator for the tool lubricant.

Closer correlation of the effect of metal structure on selection of a cutting fluid will require use of cutting fluids on a departmental rather than on a plant-wide basis.

In the coming year, many plants can expect to reach speeds of 500 sfm on various turning operations with the use of newly developed specialized cutting fluids.

Mr. Wilkie

New development which shows promise is the change from carbon steel bands to tool steel bands for production applications of bandsawing. High speed steel cutting tool required complete redesign of all DoAll band machines to provide greater power and ruggedness demanded by the production possibilities of the new tools.

This parallels the history of all machine tool development—as better cutting tools were developed the machine tools to use them were redesigned for the heavier cutting possibilities. Magnitude of the change for band machining may be seen from the fact that 18 square inches of steel may now be cut, compared with 3 square inches with the carbon blade. The new high speed blade not only cuts faster but the blade lasts from 3 to 30 times longer.

Blade is also able to cut materials that we could not saw before. This, coupled with the fast cutting and longer blade life, makes a new era in band machining.

Mr. Beardslee

Engineering advances in cutting materials during 1953 may well open up a whole new concept of tooling for the factory of tomorrow. They hold possibilities of increasing machining rates of metals at speeds and feeds undreamed of 10 years ago, and may radically change both the machine and machining practice as we know them today.

With new information uncovered on cemented carbides by our engineers, I foresee a revolution in machines in a matter of 5 to 10 years. Already several machine producers are coming up with machines that

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W. A. THORP
Works Manager, L. S. Starrett Co. Athol, Mass.

PHILIP M. MC KENNA
President, Kennametal Inc. Latrobe, Pa.

shape product components in a way entirely foreign to the accepted methods generally followed by the machine tool industry.

These machine developments foreshadow the automatic factory we have been hearing about so frequently today. Machines of the future will make use of electronic controls so elaborate that they resemble the control center of a modern battleship.

Tooling and setting up such machines will be far different from the procedures followed today. Since these new machines may work with 40, 60 or 80 single-point tools, servicing may be a job of pulling out a complete tool assembly, like pulling out a magazine from a rifle, and replacing it with a new one.

No longer will a setup man be required since changing tools will be a matter of locking a tool assembly in. And what about the setup? It will be designed into the machine.

Mr. Blackall

Growing trend towards high speed production will require increased attention to nonproductive elements in the manufacturing cycle. Optimum speeds and feeds are not the sole answer to cost reduction. Actual machining time often accounts for a surprisingly low proportion of the total production cost.

Under such circumstances, the air gage, the electric gage, and the two in combination provide particularly a suitable basis for automatic machine tool controls, or for use as floor inspection apparatus.

Incidentally, in our preoccupation with the vital task of making high production tools more and more automatic, there is some tendency to overlook the equally important need for better general purpose machine tools, designed for average conditions. There is a crying need for an attack on this problem, to develop an effective range of machine tools of advanced, yet essentially simple design, for the performance of much of the ordinary production of industry—especially small lot production. This, in the aggregate, probably represents at least half of the market and plays a tremendously vital part in our economy. Such machines should not be secondary lines in any sense of the word. They should be engineered to the same degree of precision as the most advanced high production unit, should be capable of performing high speed operations with carbide tools, and should possess reasonable flexibility in the choice of feeds and speeds. Product finish, however, rather than heavy chip removal is the important objective in such equipment, and every effort should be made to produce it at a cost which would be within the reach of the average user.

Mr. Zimmerman

It has been fairly obvious to me, in the course of our company's experience in providing services to the engineering profession, that the product engineer of the past and present has devoted much thought and effort to the creation of specific products, but has either neglected or closed his eyes to the tooling and gaging requirements that would eventually spell out the success or failure of the product.

The point of constructive criticism I should like to make then, is a plea for a closer alliance between the product designer and the tool and gage designer. To obtain increased output at lower cost, the selection of the proper production equipment is basic. However, the controlling element to productability is processing, tooling and gaging. Therefore, the product designer should be well trained not only in engineering, marketing and styling problems associated with the product, but he must keep abreast of manufacturing methods, processes, tooling and gaging.

With this type of progressive thought and action, a high degree of successful productability is more likely to be maintained.

Mr. Thorp

While precision gaging will be expensive, it will not be excessively so in the mass production industry as compared to the results obtained. So-called conventional methods will continue in the smaller shop applications of the industry which, after all, are still doing the majority of the work in the metalworking field.

Closer tolerances, however, are being held in this part of the industry and wear of gages will be minimized by further application of carbides, possibly titanium carbide, and also by the use of jewels.

I feel that the near future will see an increase in the quantity of gaging equipment used, with a decided swing toward using the present precision standards on what might be termed the ordinary work level, thus automatically bringing about closer working tolerance.

In all the foregoing we must not overlook the fundamental factor that a human brain will be needed to interpret and evaluate the data gathered, both as to size measurements and the quality of finish.

Mr. McKenna

Business end of a carbide metal-cutting tool is becoming recognized as a thing in itself. It is no longer thought of as a tipped tool but as a hard carbide cutting element attached to a shank.

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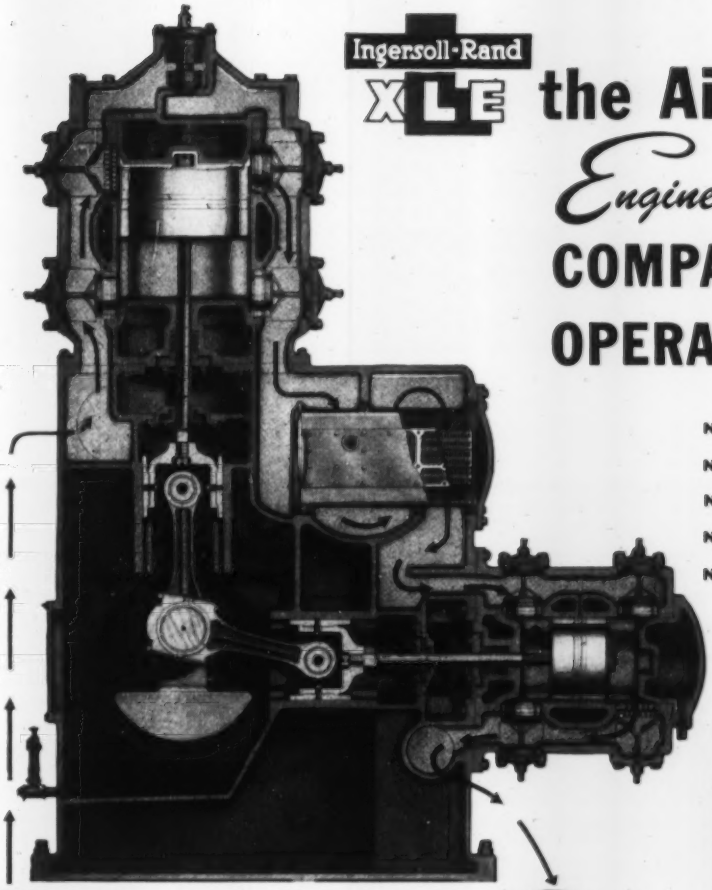

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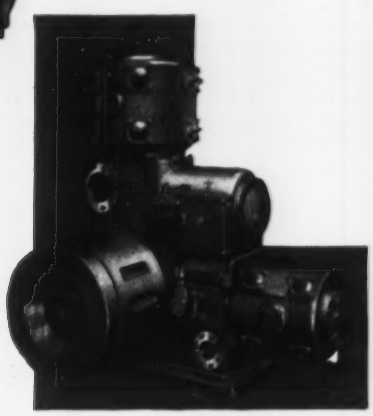

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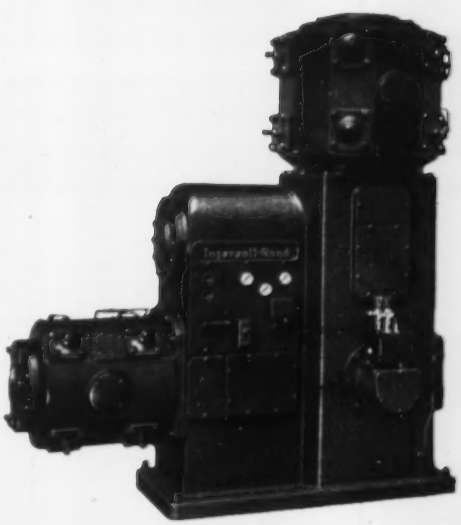

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Manager Resins and Plastics Division, Shell Chemical Corp., New York

M. M. ARLIN
President, Arlin Products Inc. Detroit

E. L. H. BASTIAN
Senior Engineer, Shell Oil Co. New York

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other applications where tungsten carbide's high Young's modulus of elasticity—three times that of steel—gives positive advantages in resisting weaving, the shank has disappeared, and we now have solid blades of tungsten carbide to fit into tool holders.

Likewise triangular, square, pentagonal and round plates or discs of hard carbide metal permit indexing of the tool blank to provide new cutting edges without returning the tool to the grinding department until the entire periphery has been dulled.

Brazed tools are widely used and within the limitations of most machining jobs are satisfactory especially as the art of brazing has become better understood.

Formed pieces, such as twist drills of tungsten carbide, spiral blades for mills, gun drills, and hundreds of other articles which may be formed economically, will be used increasingly in 1954.

Mr. Swackhamer

One of the newest applications of Epon resins, in which considerable progress was attained in 1953, is in the construction of tools and dies for the metal fabricating industries. Outstanding in this connection has been the experimental and commercial work done in cast and laminated draw and form dies for the automotive, aircraft and general manufacturing industries.

Introduction of Epon resin formulations to this field has provided a material with higher physicals, greater dimensional stability and a higher degree of compatibility with forming metals than former plastic tools, thus extending appreciably the application potentials for plastic draw and forming dies.

Draw dies of the resin have been constructed for not only prototype automotive work, but for production forming of automotive parts, certain dies running well in excess of 60,000 without need of repair. One company is currently running steel heating unit components for Epon draw dies and is looking forward to handling a substantial share of the annual production requirements with but minor die repairs. Company objectives are lower die cost, faster die delivery, lower maintenance cost and subsequently, the more frequent product restyling that these savings will make feasible.

Mr. Arlin

There is considerable broadening interest in high speed industrial electronics for automation, measuring and control of multiple machines into an integrated combination of controlled factors, tieing a separate electronic unit into a master central source and controlling same simultaneously through the integration of electronics and mechanics.

An example of this is the high-speed television-type scanner, using a radar principle of gaging and simultaneously producing 24 gaging answers in reference to fixed points and also some in reference to each other. The mechanism functions at a frequency of 30 million cycles per second, gives 100 per cent repeatability and does a thorough job of calculating and automatically segregating these parts, based on the high speed result findings of the electronic scanning system.

Mr. Bastian

Considerable industry interest centers in both oil type and water base metalworking fluids, since diverse methods of machining, and a variety of new metals necessitates both kinds of fluids.

Oil-type fluids for magnesium machining are considered necessary in the interest of minimizing serious fire hazards. Conversely, water base fluids are used on titanium since at the high tool point temperatures involved, only completely non-flammable fluids are actually safe.

Oil fluids incorporating a relatively high rate of chemical reactivity are found most useful for machining Nimonic alloys, high nickel chrome ferrous and stainless steel combinations with high speed steel tools. However, the growing use of heavy-duty water-based or soluble oils attests the commercial value of such fluids in a variety of machining operations where high rates of metal removal are combined with close finish requirements on work.

Increased tendency among fluid manufacturers and machine operators to utilize more scientific methods of evaluating performance of cutting and grinding fluids is reflected in corresponding improvements in these fluids for intended applications.

Mr. Fletcher

Progress in the last few years in the development of tool steels has been quite steady. Among these improvements are: Better and more uniform quality, general acceptance and increasing use of molybdenum high speed steels, popularity of the high vanadium high speed steels and development of abrasive resistant, high vanadium die steels.

Concurrent improvements in heat treating techniques, and better metallurgical understanding of the behavior of complex tool steels in heat treatment, have resulted in gradual improvements in productivity attainable by tools and dies.

One recent development which bids fair to become the biggest advance in the field of tool steels in a generation is the successful production of

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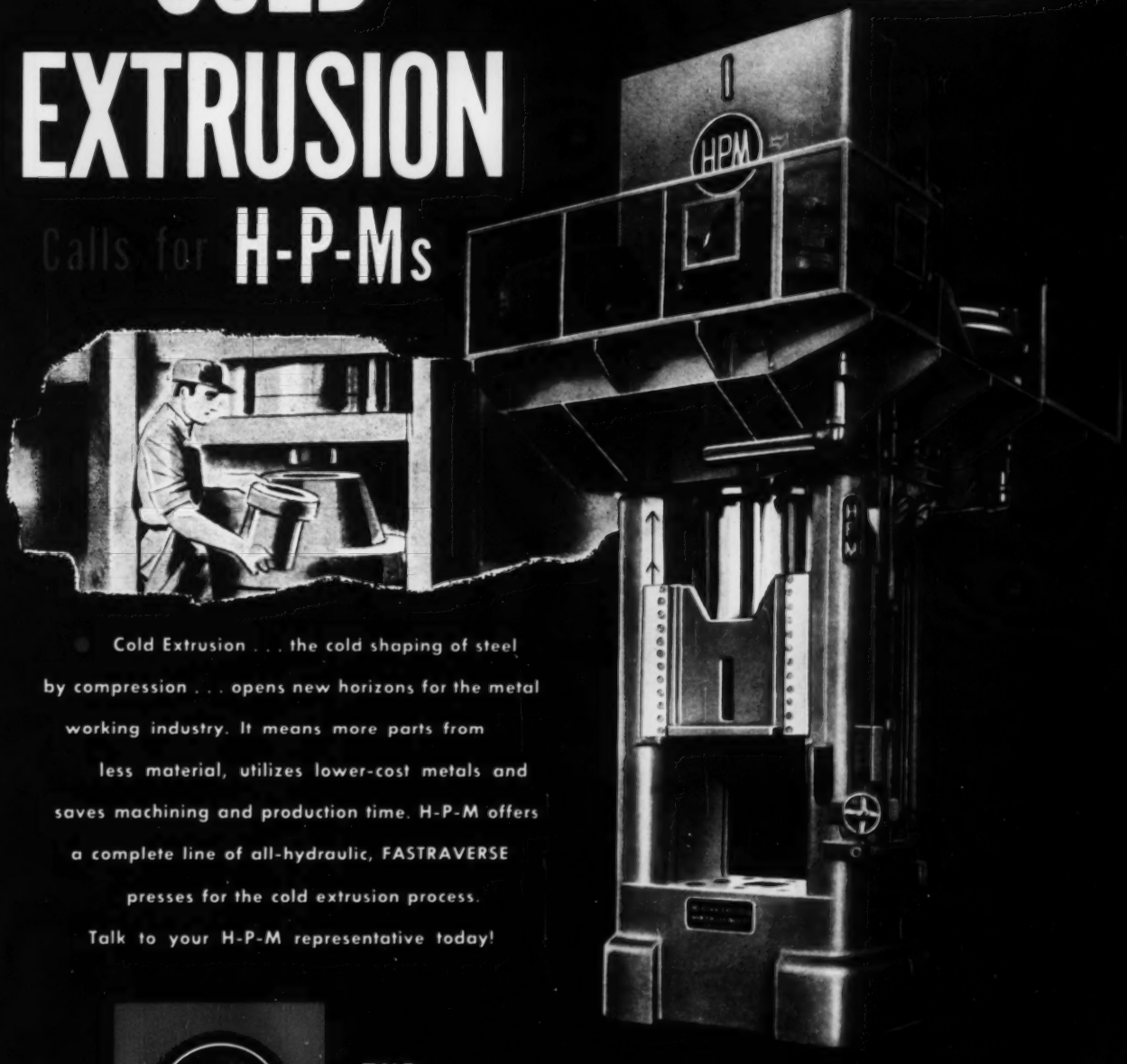

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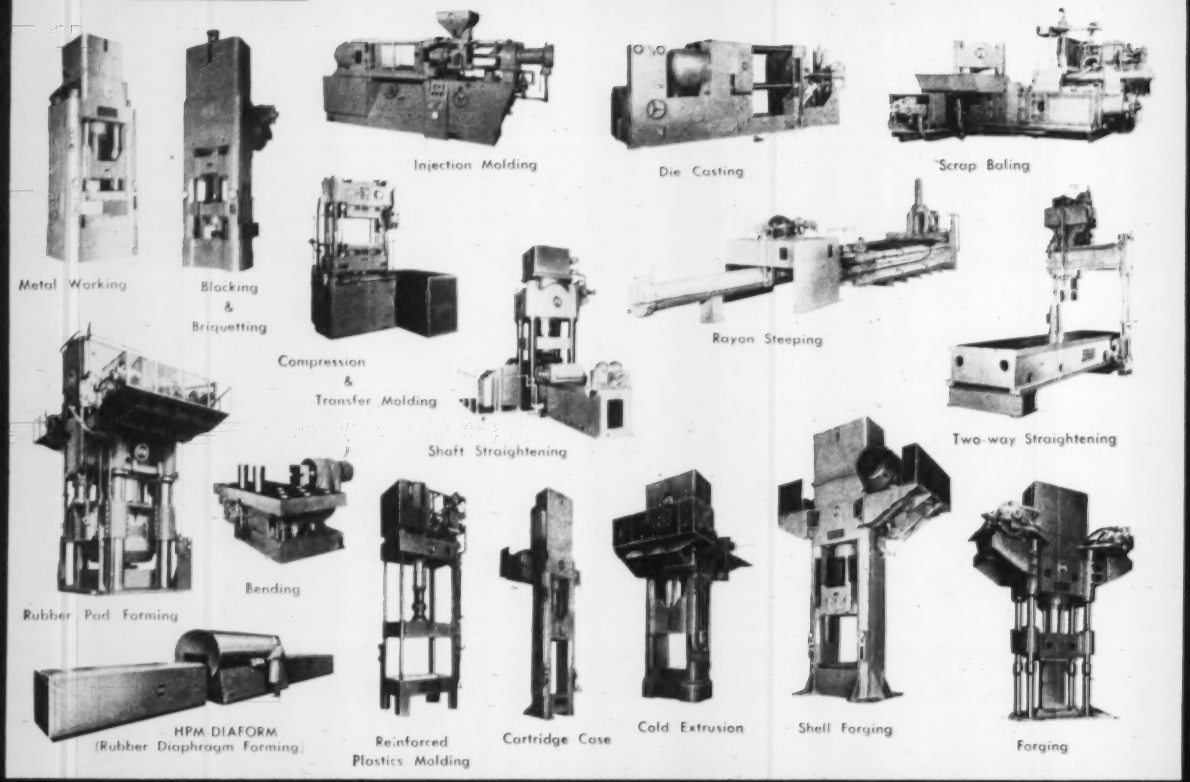

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high speed steels with internal lubrication. By suitable addition to tool steel during its manufacture, and by careful control of the size and distribution of these lubricating particles throughout the internal structure of the steel, it is possible to improve both machinability and tool life, with little or no effect on the bulk physical properties, heat treatment, or abrasion resistance of the material.

While at the present time this development has been confined to the molybdenum high speed steels, its possible adaptation to other tooling materials would greatly enlarge the benefits to be gained and would result in a tremendous expansion of the field of usefulness of tool and die steels.

Mr. Polk

Importance of precision manufacture is receiving greater attention as uniformity and accuracy are demanded. Mechanisms are being simplified to make them easier to operate and less likely to get out of order. Industry has made a definite start toward the pushbutton shop, although the goal, naturally, may always beckon on the horizon.

Numerous new developments in air gaging have resulted in expansion in new fields.

Ultrasonic method of machining is another revolutionary forward step in production. It is already promising many important accomplishments and precision cutting of hard and brittle materials such as carbides, germanium, hardened tool steels, sintered aluminum oxide, ceramics, plastics, quartz, various types of glass, sapphires and other materials heretofore considered unmachinable.

In line with past performance, industry continues to go forward in a never-ending effort to make products that work better, cost less and give more service to the user, as well as possessing better design features and more all-around efficiency.

Mr. Goodman

Technique of controlling the quality of close tolerance bores in cast iron is of a more complex nature than controlling the same bores in steel. Primarily, it is because cast iron will not bore as truly smooth as will steel, and therefore various types of air gages that may be excellently suited for steel are not as well suited for cast iron.

At first we used plug gages to size our bores, but when the operator

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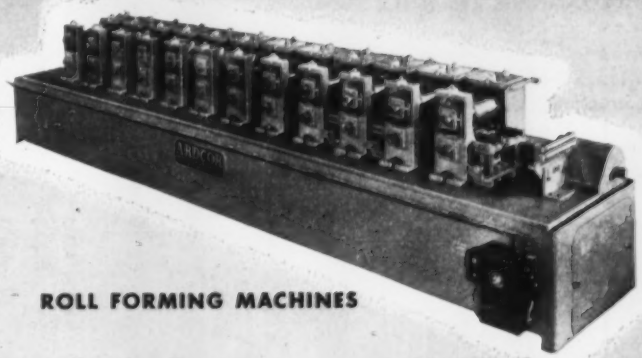

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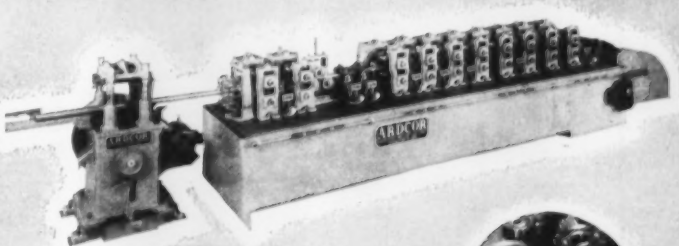

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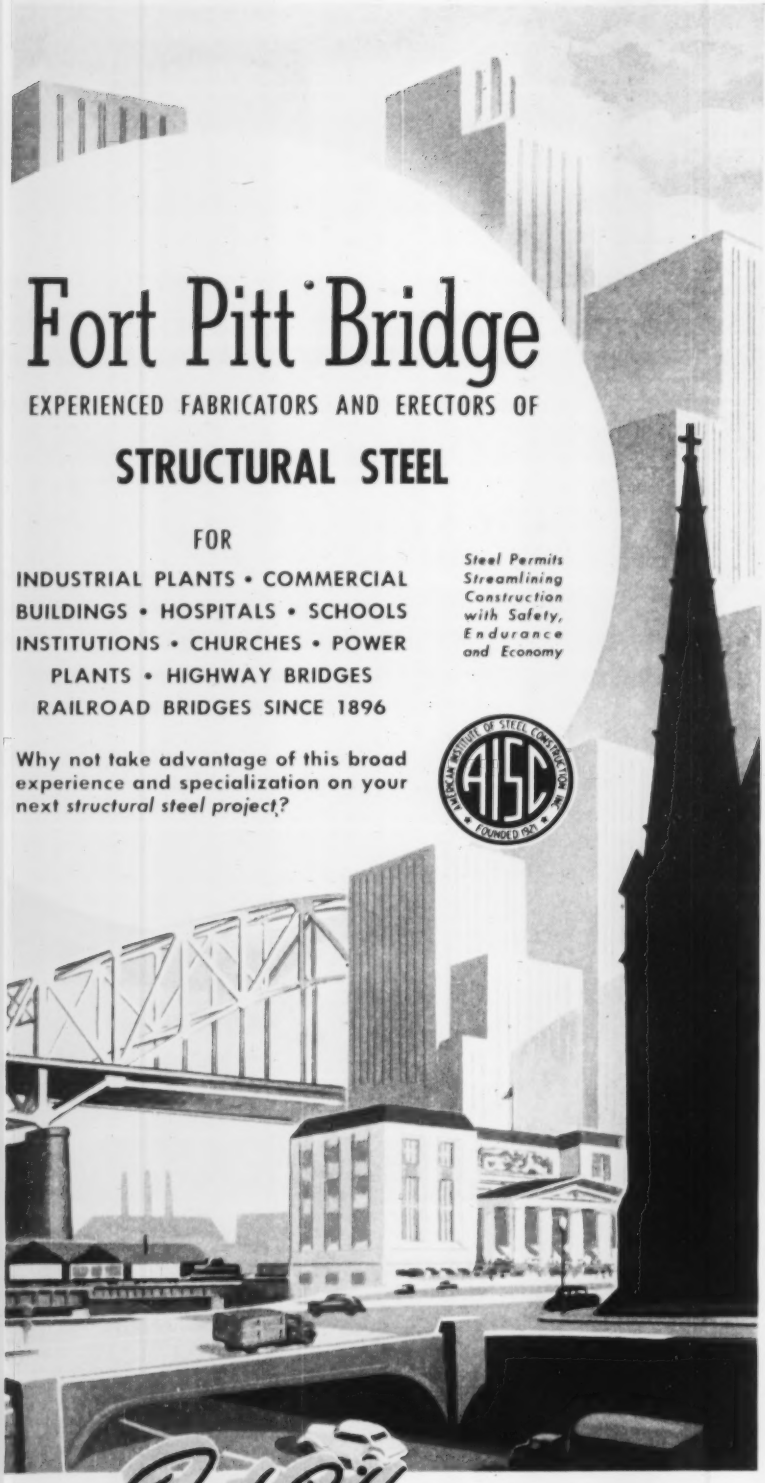

E. C. HUGHES
Vice President, Bay State Abrasive Products Co., Westboro, Mass.

found he couldn't enter the Go-gage, he had no method of determining how much more he had to machine out of the bore to make it to size. Air gages were tried and proved excellent for steel but less accurate for cast iron since the minute air pockets on the machined surface let the air escape and the bore was measured small.

About three years ago, we tried an internal three-point micrometer which has worked out excellently. With this micrometer, the operator knows at any given time exactly where he is size-wise, and therefore knows how to set his machine. These micrometers furthermore take a large range of sizes without special masters being necessary. We have had a minimum of bearing bore rejections since we introduced these micrometers.

The other factor on bearing bore quality is center-to-center distance. This is easily controlled by a special center mike, which measures center-to-center distance of any two bores (whether they are a matched size or not) directly and without the use of blocks and plugs, with their troublesome adding and subtracting calculations.

Mr. Hughes

Grinding wheels and abrasive bonded products play a big part in setting up any tooling program, starting with the production of basic raw materials in foundries and steel mills.

Even wider grinding wheel applications are involved in the machining of end products or components made from these basic metals, both present and alloys in the development stage.

It is the tool engineer who must evaluate and select the best method of stock removal from rough cast-

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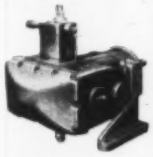
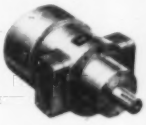
Comparison will prove why more and more users, year after year, insist, on Denison HydrOILic Pumps and Controls for circuit needs of every type. **Let us send you bulletins covering your needs.**



High Pressure Pumps. Hydraulically balanced axial-piston design. 2500, 3000, 5000 psi capacities. Constant or variable volume. 3.5 to 35 gpm capacities. Volume control (for 10, 20 and 35 gpm models only) by handwheel, stem, cylinder, or pressure compensation. Face, flange, or foot mountings. Catalogs P-4-1, P-4-2, P-4-3, P-4-10.

Pumping Units. Self-contained pumping units. Entire pump, motor and valve assembly is unit-mounted on reservoir top. 46 models offer 2 to 35 gpm capacities, for 400 to 5000 psi operating pressures. Constant and variable volume types. Volume control by handwheel, stem, or pressure compensation. Automatic water-cooled oil coolers and 2-pass heat exchangers available for extra duty. Bulletin PU-4.



High-Torque Fluid Motors. Denison high-pressure axial-piston fluid motors offer torque capacities from 13.8 to 112 inch-pounds per 100 psi — equivalent to 3 to 160 hp output at 5000 psi. Maximum operating speeds from 1500 to 3000 rpm. Face, flange and foot-bracket mountings. Catalogs FM-2 FM-3.

Dual-Purpose Pump Motor for 2000 psi. Denison's single-stage, vane-type Pump Motors, for continuous use at pressures to 2000 psi, **are ready for either pump or fluid motor duty without alterations.** Rotation of shaft — either direction, without change or adjustment. Four sizes, plus interchangeable cam rings, offer pumping capacities from 3 to 82 gpm, or torque ratings from 13 to 257 inch-pounds per 100 psi. Catalog P-5.

Direct Operating Pressure Controls. These low-cost valves, provided as relief, sequence, unloading and counterbalancing controls, assure smooth, chatter-free control and fast action, in systems up to 2000 psi. Available with or without built-in checks. ½" to 1½" sizes, with optional pressure ranges in each size. **Catalogs VRD-1 through VRD-8.**

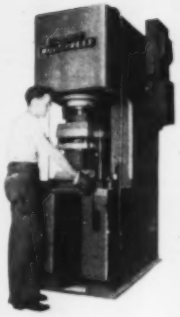
Multi-Range Flow Controls. Denison Multi-range Flow Controls permit **full-scale** regulation of flow in variable speed circuits. Easily adjustable to various pump deliveries **without changing spools.** Compact, cartridge-type, single-spool design is ideal for meter-in, meter-out, bleed-off and other operation at all circuits pressures to 3000 psi. 12 models; 2-port and 3-port types, with or without built-in check. 0 to 28 gpm capacities. ¼" to ¾" size. Catalogs VFC-1 and VFC-2.

Denison Directional Controls ¼" to 2". Denison 4-way valves are ruggedly built for every need, in ¼" to 2" sizes, for all requirements to 5000 psi. Manual, mechanical, electric and pilot control of valve operation, with combined pilot-operated solenoid controlled models for your toughest jobs. Three-land spools in sturdy subplate or threaded body types provide dependable service. Catalogs VD-3, VD-1-1, VD-4-2.

Surge Damping Control. Eliminates destructive pressure shock in hydraulic systems to 5000 psi. Easily installed. Does not affect cycle time or function of other components. Adjusts automatically to any working pressure; acts with split-second speed. Industrial and aircraft types available. Catalog VS-1-A.

Pressure Reducing Valves. For independent adjustable reduction of line pressures in secondary circuits while the primary circuit operates at higher pressures. For requirements up to 5000 psi and from 20 gpm to 65 gpm. Threaded, flange and subplate mountings. Catalog VPR-1.

MULTIPRESS®



MULTIPRESS offers maximum advantages of hydraulic power — **rapid action, wide adjustability, and accurate control.** Nine frame sizes meet an unusually wide range of production needs. Ram speed, maximum tonnage, and stroke length are quickly adjustable. Stroke length can be set for either distance or pressure limits. Choice of controls — hand-lever, push-button, foot-pedal, automatic cycling, and **dual** manual or electric safety controls. Denison's exclusive "Vibratory Ram Action" is available for problems of air escapement from dies, density control, or uniformity of compaction.

Standard Multipress accessories provide extra speed and efficiency on many operations. These include Index Tables, Dial Feed Tables, a Harmonic Stock Feed for continuous production from coil stock, preform equipment, straightening fixtures, foil marking equipment and others.

Touch Control. Multipress is also available with "Touch Control". Ram starts, stops, speeds up, slows down, reverses and applies pressure in exact **split-second relation** to the way the operator moves the hand lever. Pressure can be applied to work in varying degrees of force, at the user's option.

SPECIFICATIONS		BENCH MODELS				FLOOR MODELS					
Frame Size		B	D	F	G	H	K	L	N	Q	
Capacities (Tons)		1	2,3,4,6	2,4,8	5,10	5,10,15	25	35	50	75	
Max. Ram Speeds (I.P.M.)	Closing	1100	1300	1300	700	700	530	530	290	210	
	Pressing	400	570	570	220	280	250	250	145	110	
	Opening	600	920	920	310	500	470	470	290	220	
Max. Stroke		6"	12"	12"	12"	12"	15"	15"	15"	15"	
Max. Daylight Open'g		15⅛"	12"	18"	24"	23"	24"	24"	24"	30"	
Throat Depth		5"	6"	8⅛"	12"	10"	12"	12"	12"	10"	

CHOICE OF MANUAL AND AUTOMATIC CONTROL VALVES FOR ALL MODELS

Hydraulically Balanced Pressure Controls. Denison hydraulically balanced compound valves provide unusually close control over valve opening and closing pressures.

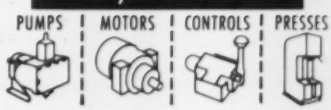
They assure improved performance for systems up to 5000 psi . . . equal efficiency for both low and high pressure circuits . . . trouble-free service . . . an adjustment range for your exact needs. Proved in thousands of installations from the simplest to the most complex automatic systems. Types and sizes for all needs — ¾" to 2". Catalogs VR-2-B and VR-S-2.

Check Valves ½" to 1½" to 5000 psi. Denison Check Valves in pilot-operated standard and sandwich-types, are available for circuit requirements up to 5000 psi. Simple design, rugged construction, and replaceable valve seats simplify maintenance. Subplate or threaded body types. **Catalogs VPC-1 and VPC-2.**

"The Finest Money Can Buy!"

DENISON HydrOILics

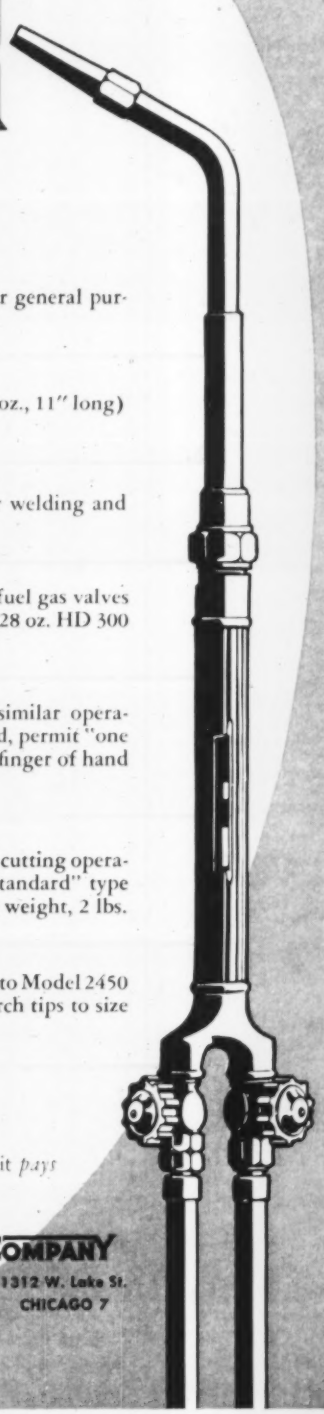
PUMPS | MOTORS | CONTROLS | PRESSES



The DENISON Engineering Co., 1163 Dublin Rd., Columbus 16, Ohio

Which of these most popular models

by VICTOR *best fits your needs?*

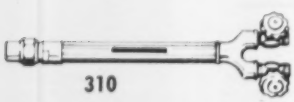


300 SERIES WELDING TORCHES

DESCRIPTION, APPLICATIONS

315

A compact 18-oz., 9-inch torch ideal for general purpose welding and cutting.

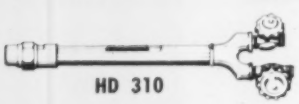


310

A medium weight and length torch (21 oz., 11″ long) for all around use.

300

A long (14″) torch for users of larger welding and heating nozzles; weight 24 oz.



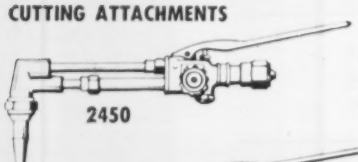
HD 310

Heavy duty models with high capacity fuel gas valves for large gas flows. HD 310—11″ long, 28 oz. HD 300—14″ long, 32 oz.

P 310

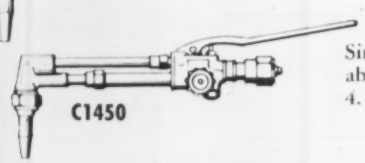
Especially designed for pipeline and similar operations. Gas control valves, at forward end, permit "one hand" adjustment with thumb and forefinger of hand holding torch. 9″ long, 22 oz.

CUTTING ATTACHMENTS



2450

Handles a full range of general purpose cutting operations up to approximately 8″. Uses "Standard" type cutting tips up to size 5. Length is 13″; weight, 2 lbs.



C1450

Similar in size, weight and construction to Model 2450 above, but designed for smaller "C" torch tips to size 4. Cuts to approximately 6″.

Look for the Victor dealer sign!

—Ask him to show you why it *pays* to standardize on VICTOR.

Dealer Inquiries Invited VICTOR *for welding*

VICTOR EQUIPMENT COMPANY

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#1

H. E. CONRAD
Executive Secretary, American Society of Tool Engineers, Detroit

ings and forgings. His wide range of knowledge must be used to compare the advantages of machining, broaching, grinding, etc., keeping in mind the costs, equipment available and latest developments in each of these fields.

Grinding techniques and abrasive product specifications must develop with equal speed to keep up with this rapid progress in metal development. The abrasive industry is investing huge amounts of money and time in its research and plant-expansion programs and is in excellent position to meet this challenge.

Mr. Conrad

Industry's needs for engineers, properly trained to do their jobs, can not be considered to be alleviated because of a temporary easing in international pressures. Only with a long-range program, directed toward developing an adequate number of trained engineers, can we be assured that there will be enough technical skills available to cope with problems of military and civilian production.

Technical and professional societies must take the lead in recognizing this problem, procuring the necessary engineering manpower and providing training necessary to utilize engineering talent to the greatest advantage. The same type of years-ahead planning that is applied to manufacturing problems must be used in arriving at the best method to effect a solution of the problem of engineering manpower. In the automotive, appliance and other industries, tooling plans for 1955 and 1956 models are well underway. We must also get our "tooling" started now to meet the engineering requirements for years ahead.

When your jobs reach Process Engineering...

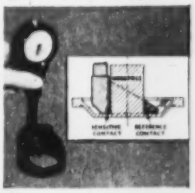
. . . call FEDERAL in for Gage Engineering!

WE FIND CASE AFTER CASE where process engineers specify and build entirely new gage designs when a quick modification of a Federal catalog gage would do the job better, faster, and at less cost. When you start to process your jobs, that's the time to take advantage of our years of experience in designing every sort of dimensional visual gage: at Federal we know the basic difference between designing and building precision gages and designing other mechanical products.

Designing precision gages requires knowledge of how to *magnify* and *transfer* measurement variations *precisely*, without loss of motion — with a minimum of friction and inertia in the working parts — and a hundred other details which do not concern the usual tool and machine designer.

Call in Federal when you *start* processing a job and let us engineer your gages for you. Federal Products Corporation, Providence 1, Rhode Island.

Regular Federal Snap Gage modified to inspect gear teeth spacing.



Basically a hole gage, modified to measure O.D.

Three indicating depth gages modified to suit special requirements.

FEDERAL

Largest manufacturer devoted exclusively to designing and manufacturing all types of DIMENSIONAL INDICATING GAGES

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I am interested in the latest improved gage or gages below:

☐ Dimensional Dial Indicators
☐ Dimensional Dial Gages
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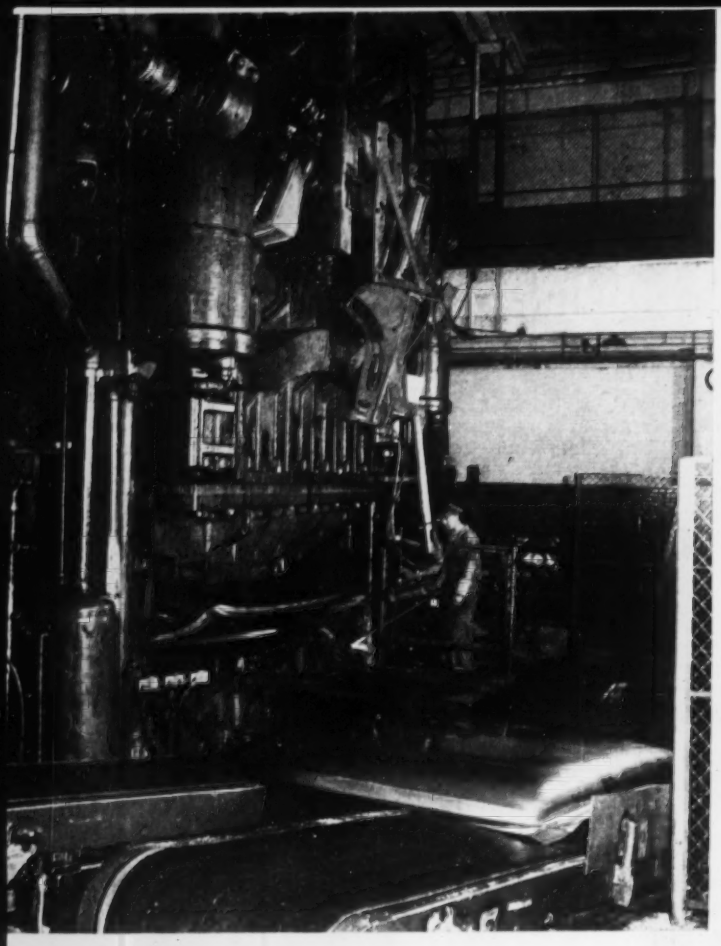

TECHNICAL PROGRESS

Forming

THERE is an air of eager expectancy in the metal forming industry: For during this and the next few years, cold extrusion of steel is scheduled for an all-out effort in nonmilitary applications.

Its eventual, if not immediate, success is not in doubt. Rather, the question today is: Where will it gain entry?

At this early date, the first strong bid is expected from the automotive parts industry. As one observer sees it:

The process seems well suited to the production of axles, housings, crankshafts, connecting rods and many other symmetrical parts. Think of an auto rear axle housing as strong as your present one, but weighing half as much, and you'll catch a glimpse of some of the possibilities ahead.

Of course, problems remain on the unsolved side of the ledger, but makers of presses, dies, lubricants and phosphate coatings are putting their smart money on what they see as a sure winner.

Other significant trends: Cold coining methods, based on cold extrusion principles and practices, are being viewed as possible substitutes for hot forgings; production of titanium-alloy parts for aircraft is commanding top attention in the forging field; and, on the equipment side, built-in transfer mechanisms and automatic feeding devices are intriguing the high-volume, end-product producers.

Mr. Cotner

Cold extrusion of steel probably is one of the most challenging developments today in the metalworking industry.

Tremendous pressures are required, and the outlay for mass production of cold extruded steel parts is substantial, but a review of some of the advantages obtainable points the way to many applications.

Cold extrusion converts low-carbon, granular steel slugs into parts with the metallurgical characteristic of forgings. Finer, fibrous molecular structure, resembling the characteristics of a forging, give the part tremendously greater strength than an ordinary casting of comparable size and weight. Consequently, cold-extruded steel parts can be much lighter than their cast counterparts. Fifty per cent weight reductions in parts are common. Many require only a stress-relieving, normalizing trip through an annealing oven to be ready for use—some simpler parts

may not require heat treatment.

Producers of automotive parts probably will be among the early civilian users, for the process seems well suited to the production of axles, housings, crankshafts, connecting rods and many other symmetrical parts. Think of an automobile rear axle housing as strong as your present one but weighing half as much, and you'll catch a glimpse of some of the possibilities ahead.

☑ Mr. Schaefer

Most widely publicized achievement of the open die forging industry in 1953 was the manufacture of a number of unique forgings intended for component parts of the forging and extruding presses being built for the Air Corps "Large Press Program". Many of them were unusual in size or shape.

Press columns have been forged in rectangular section in lengths over 100 feet. Cylindrical columns of alloy steel have been produced requiring the largest ingot designs to date. Forged crosshead plates are in process which, in final form, will be tremendous weld-fabrications of forgings about 40 feet in length, 10 feet in width, and 12 inches thick, together with castings approaching these dimensions.

No such spectacular work is in immediate prospect for 1954. However, we may look for a continuation of the steady progress in the quality of forgings. This is manifested in the gradual improvement of tensile properties in forgings of large section. Not many years ago 65,000 psi was the top limit for yield strength in alloy steel forgings in sections too large for liquid quenching. Now large forgings are produced with yield strengths of the order of 95,000 and 100,000 psi.

☑ Mr. Crane

Novelty of cold extruding steel is wearing off, but the process is achieving sound production demonstration and finding more and more commercial applications.

Question of using mechanical or hydraulic presses is still undecided. More manufacturers appear to be choosing mechanical types, although there are many hydraulic, cold-extrusion presses going through presently.

Basic rules for success in cold extrusion:

1. Sufficient care in applying a protective, phoshate salt and metallic soap to assure the chemical bonding of the phosphate to the steel and of the stearate to the phosphate.

2. Planning operations with conservative selection of reductions of both wall and bottoms.

3. Die construction must be well engineered. Precisely and rigidly centered punches should have the benefit of a stress relief program to reduce surface fatigue. Well guided die sets should have depth stops for setting. Massive support rings for dies should be heavily prestressed, far beyond handbook shrink allowances. Pyramid support for the dies on heat-treated members designed to spread the working strain adequately over the press bolster is important.

Highly significant is a trend to review hot forgings and to substitute cold coining methods, utilizing the same principles and practices as are developing in cold extrusion.

☑ Mr. Leake

The metal stamping industry is making the most of changing economic conditions.

With greater availability of steel, deferred products may be introduced and the old may experience an overdue "face lifting." New processes have enlarged the beneficial scope of stamping possibilities.

More and more stampings are emerging "untouched by human hands." Built-in transfer mechanisms and automatic feeding devices are intriguing the high-volume, end-product producers.

The accent on cold extrusion, a process that achieves "alloy" results with "low carbon" economy, is shifting to civilian production. Stronger and lighter metals are becoming economically feasible for a variety of new uses. Many new substitutes are relieving the scarcity of strategic metals in short supply.

Greater attention is being paid to the design of drawing dies to obtain maximum results. New coatings and drawing lubricants are making annealing between operations the exception rather than the rule. Results

JAMES M. LEAKE
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NEMA-rated at 200 amps.

—but pulls 300 amps.!

Runs all day on one tank of gas!

New P&H WN-250 Engine-Driven

Here you get everything you've ever wanted in an engine-driven welder — including features you don't get from any other.

Take a quick look at some of the WN-250 advantages that help you keep step with demanding production schedules; help you cut costs:

(1) The P&H WN-250 has more capacity than other welders with the same rating.

(2) It has a full 20-gallon gas tank.

(3) It gives you the latest-type P&H welding generator, powered by a direct-connected gasoline engine. It's a four-cylinder, 180GLU Waukesha, water-cooled and built for heavy duty. And we really mean *heavy* duty — it's not an automotive light-weight. Available with electric starter.

(4) The WN-250 is equipped with a P&H idling device that establishes the rated speed of 1800 rpm as soon as the arc is struck. This speed is maintained for a set period after the arc is broken.

(5) It has P&H's famous Dial-lectric Control. An easy turn of a radio-type knob provides stepless heat adjustment over the entire high or low range.

(6) It has pre-lubricated bearings, to reduce the need for servicing and insure longer life.

(7) It has an auxiliary AC power supply (1KVA) that permits floodlighting and running power tools, while welding.

There are other reasons why you're money ahead with a P&H WN-250. Ask your P&H representative or distributor for all the facts. Or, write for bulletin.

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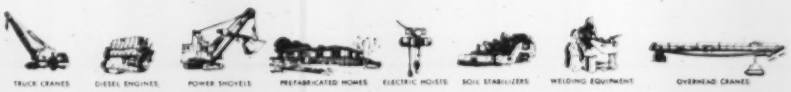
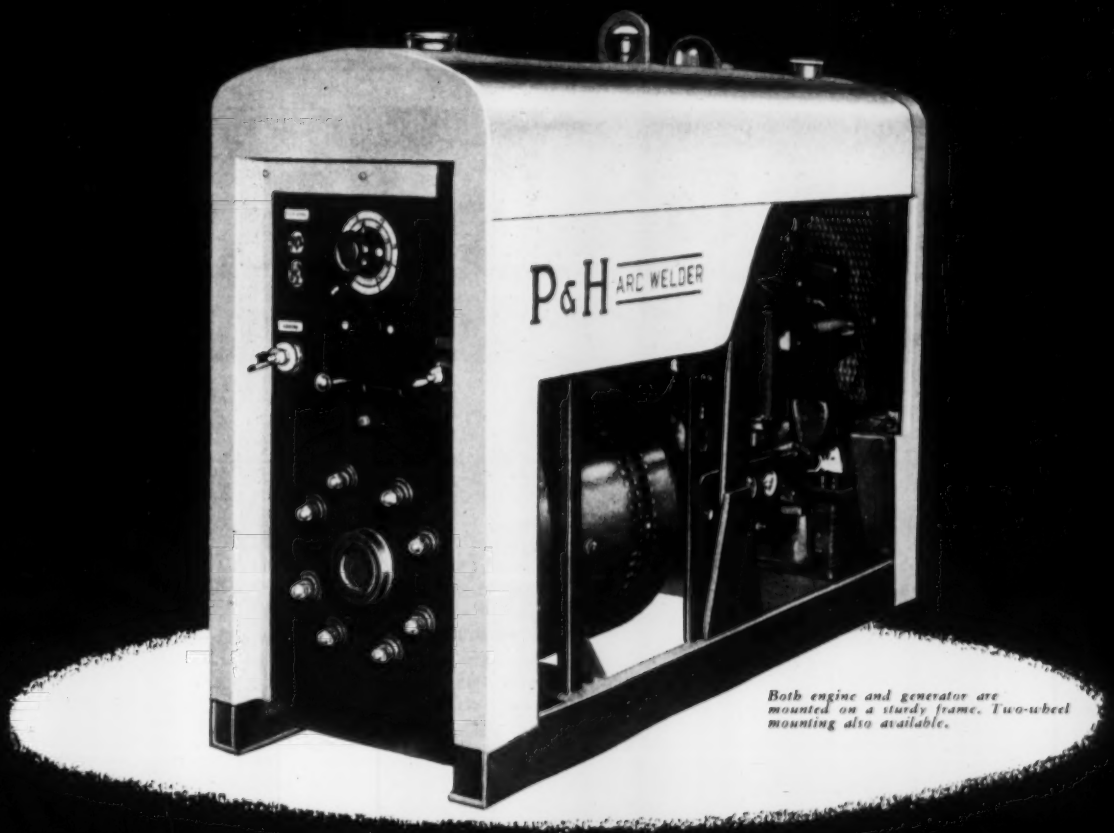
the P&H *Line*





Both engine and generator are mounted on a sturdy frame. Two-wheel mounting also available.

Arc Welder

America's most complete line of Arc-welding equipment and electrodes

Continuous 8-hour welding test demonstrates the extra stamina of the P & H WN-250

You can't beat welding performance like this: In a recent test, the P&H WN-250 operated continuously for 8 hours on a 70% duty cycle.

A $\frac{5}{32}$" electrode was used with 300 feet of cable. There were 250 amps. at the electrode. So that the test would be continuous, three welding operators were used. When one got tired, another took over. All used the drag technique with a 6010 rod — which is as close to a short circuit as you can get.

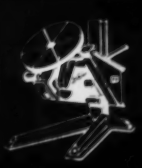
At the end of 8 hours, the P&H generator was still cool. And the WN-250 was still rarin' to go — the weldors were worn out, but not the machine.

P&H AC WELDER

A full range of sizes up to 625 amps. (NEMA-rated). All are connectable to 220 or 440 volts. Dial-lectric Instantaneous Remote Control is fingertip control — gives you any heat you want—right at the work.

P&H DC RECTIFIER WELDER

Three sizes — 200, 300, and 500 amps. (NEMA-rated). No moving coils — no bearings, brushes, commutator, brush riggings, etc. Dial-lectric Control gives you finger-tip heat-control at the work.



P&H POSITIONERS

One finger is enough to position heavy weldments for economical downhand welding. Capacities from 2500 to 36,000 lbs. — remote control and hand operated models.

P&H ELECTRODES

A type and size for every job — to give you cleaner, sounder welds at lower cost on mild steel, cast iron, "hard-to-weld" steels, stainless steels, or hard surfacing.

P&H Welding equipment is manufactured and sold in Canada by

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Sales Manager, Metal Processing Dept. Pennsylvania Salt Mfg. Co., Philadelphia

R. W. BRECKINRIDGE
Technical Director, Pressed Metal Institute, Cleveland

once considered impossible are commonplace.

Plastic dies have weathered the gruelling test of extensive production and have gained unqualified approval in influential circles. The superb performance of heat-treatable, "cast to shape" die steels has also made a worthwhile contribution to the economics of stabilizing die costs.

Mr. Clarke

The excellent film sponsored by the Drop Forging Association, entitled "Forging in Closed Dies", calls attention to the over 600,000 different drop forgings being made in today's forge shops. The continually growing use of and consequent demand for forgings creates the opportunity for producers to enlarge their share of the market by the adoption of more efficient, productive tools and methods.

Today, shop managers and engineers are critically evaluating traditional forging practices in light of recent technical developments. All phases of the operation are being studied from the receipt of the bar stock through shearing, heating, forging, trimming, heat treating and inspection with emphasis on mechanization wherever possible.

In short, the ground-work is under way for what is forecasted to be a period of evolutionary change in the industry—a change which will insure an increasing growth of the industry as the products of forging emerge to challenge parts made by other methods of forming.

Mr. Duffy

Our plans for the future are based on a firm belief that cold extrusion shops—contract and captive—will take their place as an important segment of the metalworking industry within the next few years. Here are some signposts:

Cold extrusion of ordnance components is providing companies with a fund of experience. We expect that many will utilize its advantages (high surface finish, low scrap loss and accurate sizing) in shaping parts for civilian uses.

Increased use of cold drawing and extrusion procedures has brought with it a growing use of two types of lubricants that withstand greater pressures:

The inorganic-type films, such as the phosphate coatings, to provide separation of working surfaces; and dry organic lubricants used along or with inorganic coatings. Higher melting and special functioning components have been included in these lubricants to improve upon their overall effectiveness.

Mounting emphasis on drawing of stainless steel has pointed up the great need for a good lubricant. Intensive experimental work has been done in an effort to supply this need, and some new materials have been introduced. Greater efforts will be made in this direction and superior metals will evolve.

Mr. Higgins

In 1953, the stamping industry shipped some 10 per cent more dollar volume than the year before. Increase was predominantly in automotive parts.

Customers tightened requirements, demanding more ingenuity of custom stampers, to meet close tolerances, to remove the burrs and to avoid scratches.

In general though, previously established trends did not alter—larger parts and greater use of sub-assemblies instead of individual stampings.

Cold extrusion of steel is continually on the increase, and seems to lend itself particularly well to pressure cylinders and accumulators. Growing shortrun stamping field is strong.

Interest in new metals has generally continued, but problems of delivery, costs and quality of material have slowed the growth of titanium use. This metal is substituting principally for stainless steel. However, the general market for stainless has not been substantially affected by this, as much as by the competition of glass in TV cones.

Some interest is being expressed in the different metals precoated with vinyl plastic which can be drawn without altering the bond.

Mr. Breckinridge

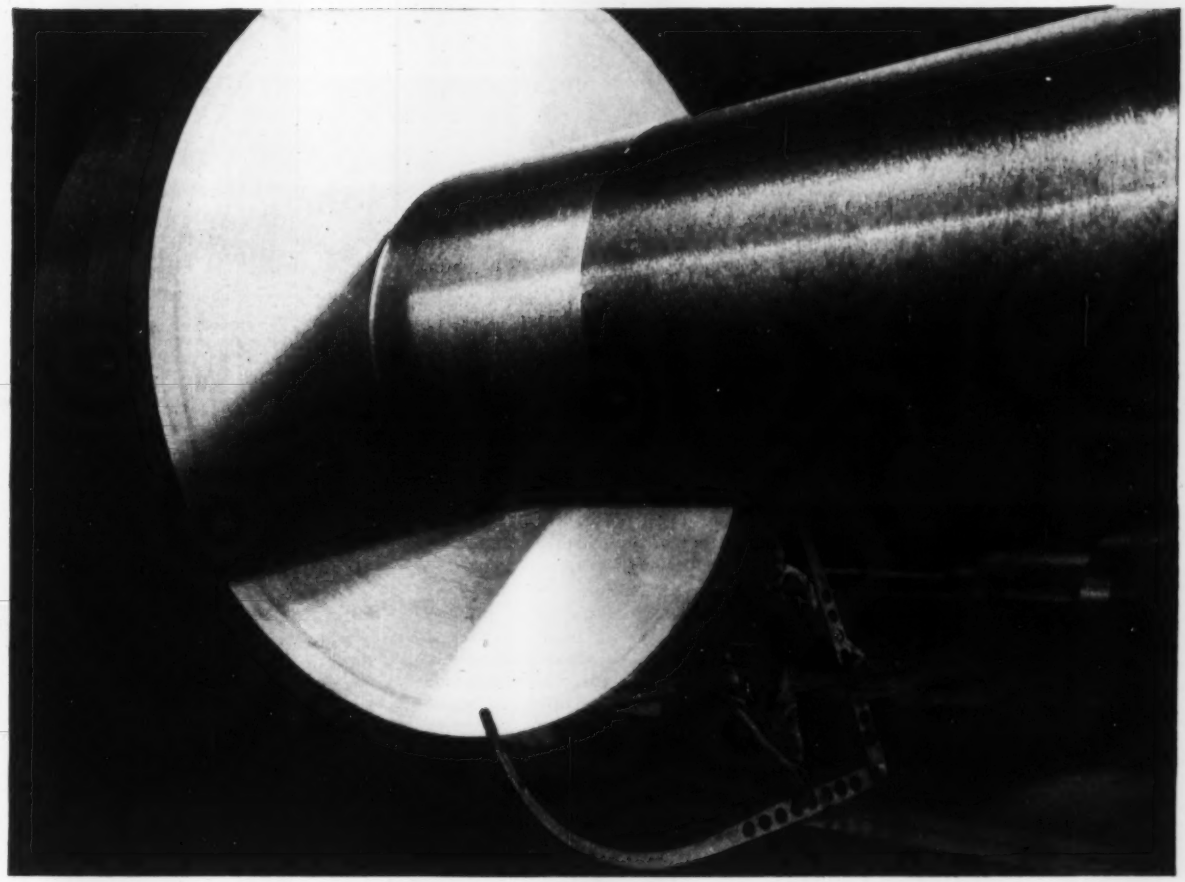
The metal stamping industry is as old as history and as new as tomorrow's hair do. Modern electronic devices help stamping companies produce better stampings at lower prices. These companies are constantly looking for improved materials and methods to better serve the public.

New equipment, devices, etc. increase the variety of products. Stamping companies are producing products once considered impossible. Scope of the industry ranges from short runs to mass production, from small to large parts and a variety of assemblies.

Presses having faster speeds with higher production are made possible by more rugged construction, accurate control and positive feeding of material into the presses.

Producers of sheet and strip material are making more uniform products to meet increased quality requirements of stampings. For more continuous production, coil material is increasing in use; titanium, with its special properties, is being worked.

Special lubricants help produce deep drawn parts. Large welding presses and small portable spot welders give



SHAPING THE SHAFT THAT TAMES WATER POWER

Product — shaft for hydro-electric generator
Overall Length — 22'8¾"
Flange Diameter — 80⅛"
Body Diameter — 34½"
Weight — 100,600 lbs.

When a hydro-electric turbine is built it must last for scores of years. That is why leading builders of this equipment come to Midvale regularly for shaft forgings.

This large 22-foot shaft being given the final check is an example of Midvale production. Exact in metallurgical specifications because of the experienced steel making practices and complete open hearth and electric furnace facilities to fit the job. Carefully forged by hands with years of forging skill on presses from 1,500 tons to 14,000 tons capacity. Heat treated in temperature controlled furnaces to assure stability of structure throughout the shaft with the best combination of strength and ductility. Then machined to final dimensions on lathes especially designed for this type of work.

This is the reason Midvale forgings — whether 300 or 300,000 pounds — are noted for their long service and never failing performance. The men of Midvale working with the right equipment and facilities offer a source of forgings, steel mill rolls and rings unsurpassed in quality and extra performance. Let their service, long experience and willingness to solve your problem help you.

THE MIDVALE COMPANY - Nicetown, Philadelphia 40, Pa.

Offices: New York, Chicago, Pittsburgh, Washington, Cleveland, San Francisco

MIDVALE

FORGINGS, ROLLS, RINGS, CORROSION AND HEAT RESISTING CASTINGS

R. G. FRIEDMAN
Vice President, National Machinery Co.
Tiffin, O.

J. F. LELAND
Manager, Cold Forming Division
Parker Rust Proof Co., Detroit

GEORGE B. MOSELEY
General Sales Manager
Firestone Steel Products Co., Akron

RICHARD B. STRIBLEY
Manager, Phosphate Products
Detrex Corp., Detroit

stamping companies flexibility in assembly operations.

Because technical developments are of vital interest, PMI recently established a technical department for its members.

The metal stamping industry is making an ever increasing contribution to our standard of living in the form of new and better products.

Mr. Friedman

Never before has the metal forming industry been so alert to improve.

Modern plants are springing up everywhere, testifying eloquently that the old art of flowing metal, whether hot or cold, has progressed.

Consequently, a highly-productive, profit-earning science has emerged, in many cases completely automated and without the age-old drawbacks of excessive dirt, noise, vibration, heat and laborious handling, storage and secondary machining.

As examples of the continually widening range of hot and cold forging work found commercially desirable, we build machines ranging from a two-penny nailmaker that makes 20 nails per second and weighs only 1500 pounds to a 10-inch, hot forging machine and an 8000-ton, high-speed, forging press weighing 820,000 and 1.5 million pounds respectively.

You can lump together the trends in our industry in these few, simple words: Forging equipment is getting bigger at the top, smaller at the bottom and more productive. The human element gets smaller, with automatic handling, automatic electric controls, automatic lubrication and automatic safety-shutoffs.

Mr. Leland

It is our firm conviction that cold extrusion will be employed by industry to a far greater extent in the coming year as basic know-how (gained from government-sponsored experimental projects) is applied to the production of other than ordnance items.

The comparatively slow progress has been due, at least in part, to misconceptions of what it is possible to accomplish in the plastic deformation of steel and the failure to realize that much available press equipment is satisfactory for cold extrusion application.

The American trade press has been largely responsible for dissemination of necessary information and has recently published more data. It includes fundamentals of tool and die design and the importance of specialized coatings and lubricants required for the extremely high unit pressures developed.

Now many manufacturers are coming to recognize, too, that greatly improved physical properties can be obtained by heavy cold working low carbon steels. They will be utilizing this and other factors in manufacturing better components at reduced costs.

Automotive field as a whole is probably making the widest search for peace-time applications of cold extrusion; for in their industry particularly, a multitude of volume production items readily justifies the expense and effort involved in the redesign and retooling required to put cold extrusion to work for the ultimate benefit of all.

Mr. Moseley

The new year, from all indications, should be another in which the metal forming industry will enjoy a particularly high level of business. It will, however, be a year in which competitive factors will be of much greater importance, and suppliers will find it necessary to give much of their attention to cost reduction in the factory.

This, of course, will be a continuance of the trend already started in the last six months of 1953, and will be evidenced to a greater degree in all customer-supplier relations.

Most fruitful area for realizing efficiency of production at this time will be in material handling. "Automation" undoubtedly will cease to be a catchword for the dream of a completely mechanized operation, and we will find it being applied in a practical manner to today's problems of cost reduction.

Expanded activity in the metal forming industry during the heavy defense programs has speeded development of many new processes and techniques in the treating of metals. This experience is rapidly adaptable to the manufacture of civilian goods and will be an important asset to many organizations in the extremely competitive market that is expected for the years ahead.

Mr. Stribley

Cold extrusion of steel is a growing industrial application for metal forming. Great strides have been made by die manufacturers, lubricant suppliers and manufacturers of the phosphate coating process (both equipment and chemicals) during the past year.

Die manufacturers had to build stronger, higher-quality dies to withstand pressures. With the experience gained most of them now need only a minimum of experimentation to build a finished set of dies.

Lubricant manufacturers, too, have gained considerable experience in cold extrusion. Lubricants are being made more stable and more compatible with the underlying phosphate coating. Important savings in time and materials are resulting.

Greatest developments have been

Cuts them by the Dozen!

. . . AT A FASTER RATE

. . . FOR A LONGER TIME

. . . WITH LESS POWER

. . . . . High speed steel, shockproof segments curl the chips out of the cut for cooler, smoother, faster cutting. Replaceable tooth segments provide an economical method of substituting worn-out teeth. Segmental cold saws are just one type in the complete Atkins line of metal cutting saws.

WHATEVER YOU SAW, THERE'S AN ATKINS SAW THAT DOES IT BETTER!

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ATKINS Silver Steel SAWS

B-W ENGINEERING PRODUCTION

SEND YOUR DIFFICULT STAMPING PROBLEMS TO—

EASTERN TOOL AND STAMPING CO.

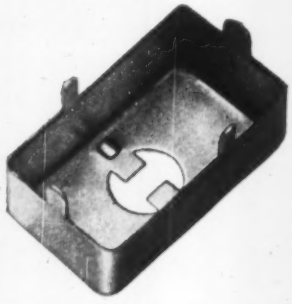
Typical example of 1-piece stamping from ⅛" thick by 7¾" diameter brass blank.

Here is a one-piece stamping that makes up into a hand stapler part.

STAMPING SPECIALISTS IN DEEP DRAWING WORK - ALL METALS - ALL INDUSTRIES

Typical intricate one-piece stamp.

Notice the reduction in this 4⅛" long by ½" O.D. tube with 1⅛" flange.



Difficult switch part for automotive industry.

Bulb base for photo flash lap and seam produced by high-speed process.

Intricate vibration mount parts for industry.

Spring tempered phosphor bronze switch contact — note flat fold-back feature.

ETS EASTERN TOOL AND STAMPING CO., Inc.

PRESSED METAL ENGINEERS

DIES AND STAMPING

SAUGUS MASSACHUSETTS

made by the producers of phosphate coating processes. Special designs of automatic phosphate coating equipment and specific chemical compounds for special analyses of steel have been developed. Their "know-how" on phosphate coating methods and complete processes is available for the assistance of prospective users.

Most of the guess work is now gone from cold extrusion. Large corporations have started their own specialized research, and are gradually shifting its application from military to civilian production.

All this points to the fact that while cold extrusion has been vital to our defense, it will become even more important throughout many branches of American industry.

Mr. Brown

General development of compression-formed, cold-worked tubing progressed during the past year. Products made from all sizes of tubes (and designed from available materials) will be feasible beyond normal expectations. Operations will include tapering the outside and varying the wall and bore configurations.

During 1954, tube reducing machines will be put into operation to manufacture cold-reduced tubing up to 17 inches in diameter. It will be possible to obtain tubing over 6 inches in diameter that is rolled to close tolerances, with near perfect concentricity, in materials ranging from ordinary carbon steel to stainless steel, as well as soft and extremely hard nonferrous alloys.

This tubing will be tailored to the application. Variations of inside diameter might be in the form of a polygon, a pline or other configured variations.

Mr. Herkenhoff

Twenty years ago, even 10, there was little reason to believe that new mechanical metal forming presses would become obsolete in a few years. Design changes and improvements in production techniques were infrequent. A depreciation period based on a useful life of 20 years was not too far wrong during that period.

Then came 1941, starting the period of intense production. Previous concepts of presses and their uses gave way to thinking on new stamping methods, new parts that could be made, redesigning of existing parts for press production and new handling methods.

Press manufacturers kept pace, and now users of press equipment are evaluating their machines and processes in terms of cost reduction. These companies, large and small, are embarking upon an extensive replacement program and are projecting their requirements years in advance.

One means of accelerating a long-term replacement program is a change in tax policy. By placing emphasis on obsolescence, industry can more effectively revise its plants and facilities.

Mr. Smith

I cannot help but repeat the prediction that I have been making for the past several years: Titanium metal will play a far more important role in the forging industry next year than it has in the past. The fact that I repeat this prediction does not mean in any sense that earlier predicions regarding this metal have not materialized as expected. Instead, it means that the growth of this new material is so rapid that each passing 12 months opens up vast new possibilities.

It would seem likely that the drop forging industry will be operating in 1954 at a high level of activity, although the 1954 level will not be so high as in 1953.

Mr. Morgan

Automation for material handling, in and out of the press, transfer, grip and roll feeds are tools that are finding greater use in maintaining production without needless operator fatigue. Dies of solid tungsten carbide, or with carbide inserts, are producing more pieces per grind.

Ingenious use of progressive dies and designs to eliminate unnecessary scrap are adding to the economy of forming intricate pieces, such as laminations, at minimum cost.

Better press design, more trouble-free operation, the use of mechanical and electrical acceleration and deceleration at critical points in each cycle all add up to not only 2 to 3 times the number of pieces per minute but a lower cost per piece, in spite of increased cost of labor and raw material.

Mr. Naujoks

Commanding top attention in the field of forgings is the production and use of titanium-alloy forgings, presently used almost entirely for aircraft jet engine use, but being eyed for a variety of uses in many other fields. High strength and low weight with good corrosion resisting properties are the lures.

The forging of the tough titanium

GRAHAM B. BROWN
Chief Engineer, Tube Reducing Corp.
Wallington, N. J.

JOHN F. HERKENHOFF
President, Minster Machine Co.
Minster, O.

C. H. SMITH JR.
President, Steel Improvement & Forge Co.
Cleveland

E. K. MORGAN
General Sales Manager, Press Division,
Danly Machine Specialties, Inc., Chicago

WALDEMAR NAUJOKS
Special Projects Engineer, Ladish Co.
Cudahy, Wis.

SHENANGO Centrifugal CASTINGS ... KEY TO SAVINGS

Basket centrifuge cylinders centrifugally cast in Monel Metal by Shenango. Used in superdehydrators for separating crystals given off from vacuum crystallizers.

3 REASONS WHY

SHENANGO parts give longer, more dependable Service

1 The special centrifugal casting process used by Shenango guarantees higher strength, pressure-dense castings free from sand inclusions, blowholes and other often hidden defects.

2 You specify the job and Shenango will supply the part cast in the exact metal formula for maximum service under your specific conditions.

3 Precision machining is done by skilled craftsmen in Shenango's modern machine shop. A good way to guarantee a perfect fit at minimum cost.

Send for Bulletin No. 150 covering nonferrous metal parts; Bulletin No. 151 covering Meehanite Metal, Ni-Resist and special iron alloys. *Address . . .*

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SHENANGO

ALL RED BRONZES • MANGANESE BRONZES • ALUMINUM BRONZES
MONEL METAL • NI-RESIST • MEEHANITE® METAL

J. E. HAWKING
Sales Manager, Pines Engineering Co.
Aurora, Ill.

alloys, extremely high priced and in acute shortage, has introduced many new problems. The narrow forging temperature range between about 1400° F and 1700° F and the high resistance to plastic deformation have required increased forging power. The need for a minimum of metal wastage has developed new forging techniques. Methods of inspection and quality control required modification for these alloys.

Experience is being gained rapidly and it seems certain that in the coming year, titanium-alloy forgings will find a broader use in the aircraft field and in other fields if the metal becomes available to industry in sufficient tonnage.

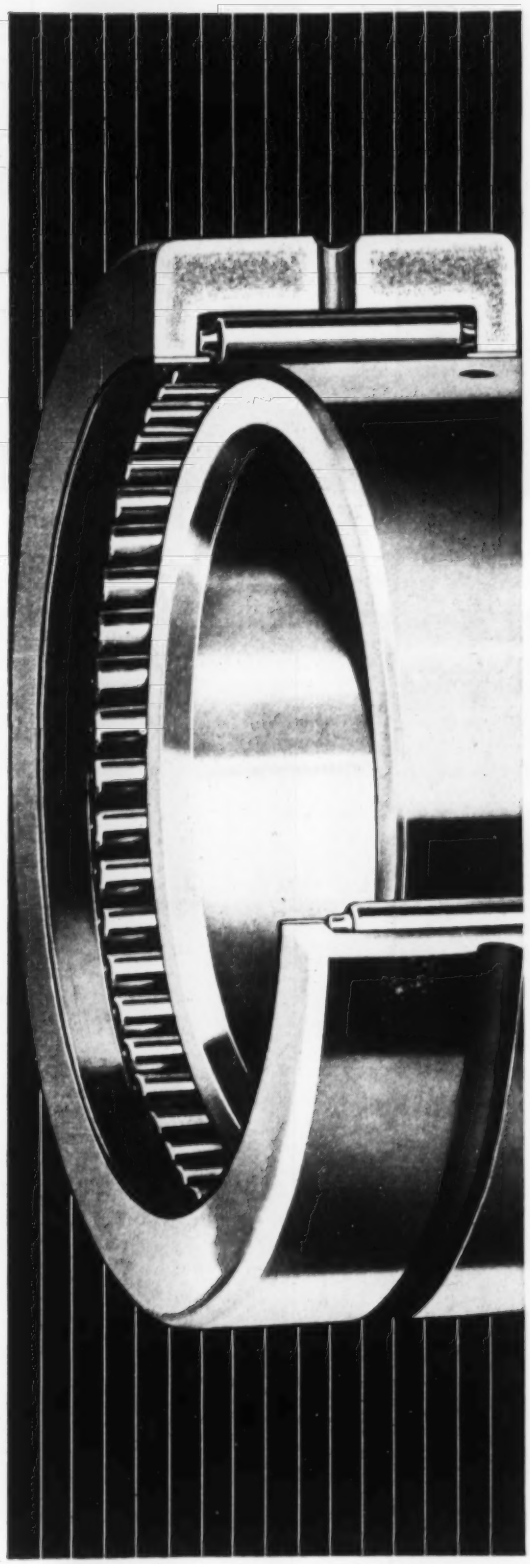
Mr. Hawking

Bending of tubing, rolled shapes and extrusions has finally been recognized as a metal forming art comparable to deep drawing, spinning and the other conventional forming operations.

Requirements of modern aircraft have provided the impetus for much of the bending development. For example, type 321 stainless steel (4 inches in diameter with 0.020-inch wall) has been bent to a centerline radius of 8 inches (2 diameters); and 4-inch diameter with 0.025-inch wall to a centerline radius of 6 inches (1½ diameters).

Many military planes now in production use tubular lines of these ultra-thin wall sections; and these precision bending machines promise to open new vistas in cost saving and improved methods for many branches of the metal working industry.

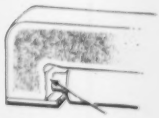
For many years, the blacksmith's rule for bending tubing was used by designers: All bends should be of the largest radius that can be used in a given area. Today, the ease with

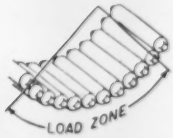


Here's why
TORRINGTON
Heavy Duty Needle Bearings
...give you top value for your bearing dollar

Carburizing grade nickel steel for both inner race and one-piece outer race gives harder, more wear-resistant surfaces, tougher, more shock-resistant cores.

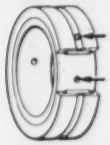
Accurately ground raceway and side flange surfaces are sturdy and eliminate drag at roller contact, keep rollers in true path. No cage required.





Full complement of rollers of precision controlled diameters assures maximum load carrying capacity.

Large roller diameters provide maximum trunnions with large fillets for increased strength—capacity—wear-resistance.



Lubrication groove in outer race, oil holes in both inner and outer races permit easy, effective lubrication to the channel and rolling elements.

Stainless steel retaining bands spot welded into position for positive roller retention. Resist entry of foreign matter. Fragile lips eliminated.

Unit outer race assembly for operation on hardened, ground shaft allows easy installation. Torrington Heavy Duty Needle Bearings are available from stock in a complete range of sizes. Try them—compare them for VALUE!

THE TORRINGTON COMPANY
South Bend 21, Ind. Torrington, Conn.

TORRINGTON *HEAVY DUTY NEEDLE* **BEARINGS**

Spherical Roller • Tapered Roller • Cylindrical Roller • Needle • Ball • Needle Rollers

May We Help You

attain more profitable metalworking methods?

Statistics suddenly become interesting when they mirror your own business. Pages and pages of this type of data, revealing the age of production equipment and telling what to do about it, have recently been published by the prominent metalworking magazines.

While aging or "depreciation" of productive equipment has long been recognized as a factor in cost accounting, a far more serious threat to efficient operation is obsolescence. It can occur at any time; whenever a machine or process becomes less productive and more costly in relation to a newly developed machine or a new method.

No company can progress and keep pace with the advance of technology without a continuous replacement policy for its productive facilities. Existing equipment must be kept on the defensive. If any piece of equipment fails to meet the challenge of survival of the fittest, it must be replaced, regardless of its age or condition, or whether or not it is physically worn out. A re-equipment policy that fails to give full recognition to obsolescence will surely lead to inefficient, high cost production.

Ask yourself these three questions:

1) Do I know what equipment in my plant is at present economically replaceable, and on what future outlook it is so?

2) Do I know what it is costing my company *not* to make the indicated replacement?

3) Do I have an organizational setup that keeps me currently and continuously informed of available replacement opportunities?

Perhaps your company now has a good equipment policy. However, for the best policy, an affirmative answer to the above questions is necessary.

Consider the Statistical Data

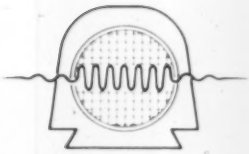
In view of the over-age machine tools spotlighted by every survey, just think how much better off the owners of this old equipment would be if the small millers, for example, had Dynapoise overarms, single crank selectors for a wider range of speeds and feeds, increased cutting capacity, optional automatic cycles. And the larger knee types should have up to 50 hp drive, Dynapoise overarm, single lever power selection of a wide range of speeds and feeds, automatic backlash eliminator, fully automatic table cycles. And all grinding machines should have FILMATIC grinding wheel spindle bearings, for they require no maintenance and no adjustment. Yes, metalworking shops everywhere would be far better off with new standard CINCINNATIS.

We Would Like to Talk to You

Of course, a dynamic equipment policy is a lengthy and intensive study. In this limited space, we can do no more than call your attention to it. Our direct factory men and sales representatives will be happy to talk to you and give you the benefit of CINCINNATI'S vast experience in metalworking. They have at their command the facilities to help you, plus the finest line of machine tools manufactured under one trademark. Right now, why not write for a copy of our general catalog, No. M-1776-1, and/or our latest equipment replacement literature "Profits Through Effective Machine Replacement Programs."

THE CINCINNATI MILLING MACHINE CO.
CINCINNATI GRINDERS INCORPORATED
CINCINNATI 9, OHIO

today's most modern engineering developments in metalworking

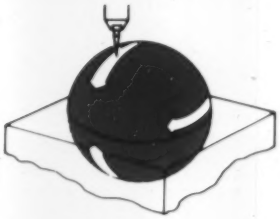


dynapoise vibration damper overarm

filmatic grinding wheel spindle bearings

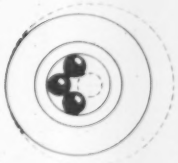
flamatic selective surface hardening

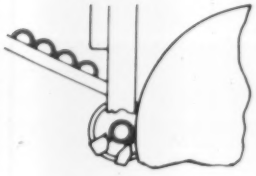
CINCINNATI



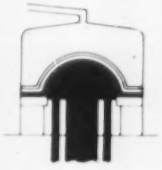
180° and 360° automatic profile milling

automatic balancing of grinding wheels



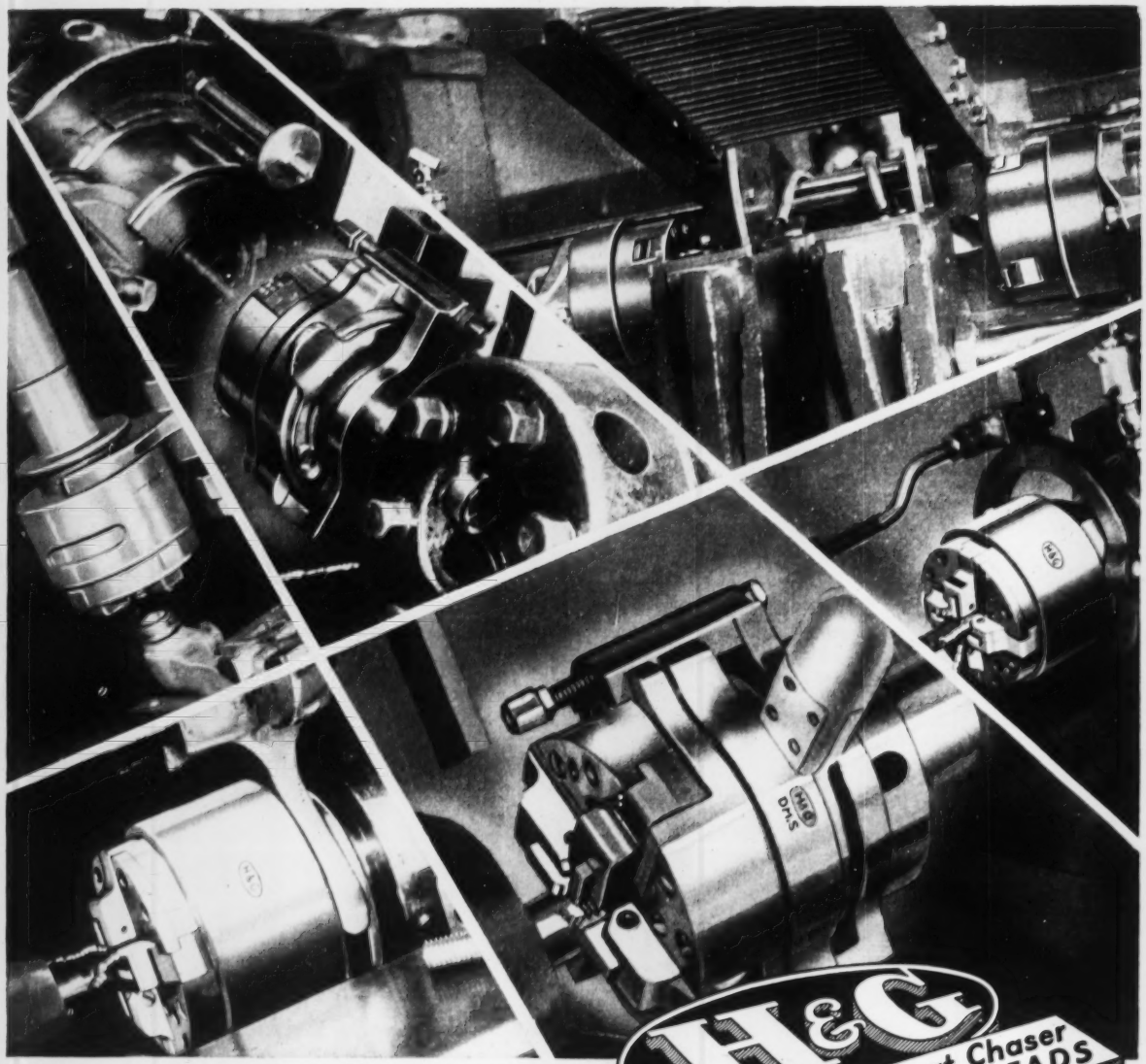


micro-centric precision grinding



hydroforming of sheet metal

single lever power speed and feed selection



1. Style MM on drill press. 2. Style DM on B & S automatic. 3. Style TM cutting taper threads on double-end threader. 4. Style MM on multi-spindle automatic. 5. Style DMS on turret lathe. 6. Style MM on threading machine.

The majority of producers of threaded parts prefer H&G insert chaser die heads

BECAUSE: 1 H&G cut high quality threads, straight, smooth and accurate to Class 3 fits. 2 Positive trip opens chasers at exact length of thread, an advantage for threading close to a shoulder. 3 Chasers are easily changed by any operator in two or three minutes. 4 The same set of chasers can be used in several styles and sizes of die heads. This interchangeability plus the low price per set reduces chaser inventory and investment. 5 The initial low cost of chasers and their extraordinary life insure new low threading costs.

Check for free bulletins: ☐ HOW TO SELECT PROPER DIE HEAD FOR THE JOB.

THE EASTERN MACHINE SCREW CORPORATION • 22-42 Barclay Street, New Haven, Conn.

NEIL VAN DEUSEN
Sales Manager, V. & O. Press Co.
Division Emhart Mfg. Co., Hudson, N. Y.

H. GREY VERNER
Technical Director, R. H. Miller Co. Inc.
Homer, N. Y.

which proper equipment makes tubular bends to centerline radii equal to 1½ and 2-tube diameters has changed the designer's practice to: Standardize all radii at 2-tube diameters. His designs are readily fabricated from standard on-the-shelf tooling in those plants where this new creed has been accepted.

Mr. Van Deusen

Metal-forming, like every other phase of manufacturing, will have to play its part in keeping costs down while increasing quality during 1954.

As manufacturers of power presses, we have turned our efforts increasingly to engineering equipped presses designed for integration into highly mechanized or automated production methods. Users can now obtain presses tooled to assemble, size or perform the full sequence of opertions necessary to produce a complete product.

The big picture in metal-forming for 1954, as we see it, is one of increased adaptation of standard presses to advanced production techniques, to cut down materials handling and provide built-in quality control over components or finished product.

Mr. Verner

The past year saw mechanical descaling of rod and wire progress from

Saved: $54,000 per year...

by converting

from castings

to

GEOMETRIC STAMPINGS

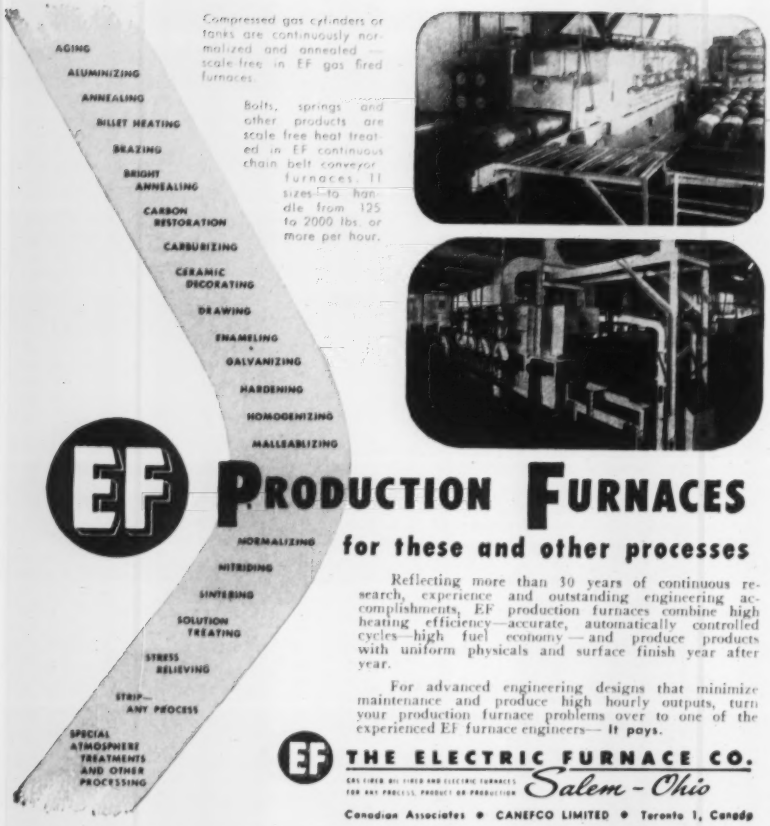
Stamping 57c

A large New England manufacturer called in Geometric engineers to study casting components of a new home appliance product. As a result the main casting shown above was converted to a stamping. Cost of the casting was $1.07, cost of the stamping only 57c—a savings of 50c on each part—or $54,000 saved per year.

If cost reductions like this make sense to you why not call in Geometric *now*—the earlier the better. There's no obligation and you may find substantial hidden profits—by converting from castings to Geometric Stampings.

Send for free booklet on Converting from Castings to Stampings

GEOMETRIC STAMPING CO.
A Subsidiary of Barium Steel Corp.
1130 E. 200th Street Cleveland 17, Ohio



Compressed gas cylinders or tanks are continuously normalized and annealed — scale-free in EF gas fired furnaces.

Bolts, springs and other products are scale free heat treated in EF continuous chain belt conveyor furnaces. 11 sizes to handle from 125 to 2000 lbs. or more per hour.

EF PRODUCTION FURNACES

for these and other processes

Reflecting more than 30 years of continuous research, experience and outstanding engineering accomplishments, EF production furnaces combine high heating efficiency—accurate, automatically controlled cycles—high fuel economy—and produce products with uniform physicals and surface finish year after year.

For advanced engineering designs that minimize maintenance and produce high hourly outputs, turn your production furnace problems over to one of the experienced EF furnace engineers— It pays.

EF THE ELECTRIC FURNACE CO.
GAS FIRED OIL FIRED AND ELECTRIC FURNACES FOR ANY PROCESS, PRODUCT OR PRODUCTION
Salem - Ohio

Canadian Associates • CANEFCO LIMITED • Toronto 1, Canada

Save Money!
Save Fingers!

Cost of Amputated Fingers

It pays to keep fingers out of presses!

AIR BLAST VALVES
Eject parts at each stroke of Press.
PRICE $29.00

PRES-VAC SAFETY FEEDERS
Blanks are fed to a press from a safe distance of 14 inches.
PRICE $35.00

Prices F.O.B. Plant

F. J. LITTELL MACHINE CO.
Speed with Safety

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CHICAGO 13, ILLINOIS
District Offices: DETROIT and CLEVELAND

Write for FREE Catalog

F. O. REEDY
Vice President, Kennedy-Van Saun Mfg. & Engineering Corp., Danville, Pa.

the plaything of the research engineer to the tool of the production man. Lubricants have been developed that allow many products to be manufactured from mechanically descaled stock under normal drawing conditions with satisfactory die-life. Products include galvanized wire, nails, welding wire and welded fabric, process wire and other wire products where the finish is not considered a critical factor.

There are a number of events which could bring about a wider use of the descaling process.

They could be: Another acid shortage; more widespread enactment and stricter enforcement of stream pollution laws; a general tightening in the marketing structure resulting in greater competition between the producers of wire products where finish is not critical; and/or development of a technique for producing an extra-clean extra-bright finish.

Mr. Reedy

During World War II, our company produced millions of various types of ammunition for the Ordnance department by forging and machining. When the Korean situation developed, we, again, were faced with the need to produce ammunition in large quantities at the earliest possible date. This time we made the decision to turn to the cold extrusion process.

Our experience with the cold extrusion of 81MM mortar shells has been extremely successful.

For example, when cold extrusion is compared to former methods, approximately 4 to 5 pounds of steel are saved on each shell. Had this shell been produced during World War II by cold extrusion, at our plant alone, 40 million pounds of steel would have been saved. Another surprising disclosure is that

W. C. DENISON
President, Denison Engineering Co.
Columbus, O.

the shell manufactured now is made at less cost than during World War II, notwithstanding the fact that there has been a considerable cost increase in labor and material.

Little machine work is required after the shell has been produced by the cold extrusion method, and a small loss of material is encountered in the entire process. We have every reason to believe that as this process is further developed and applied to other types of munitions, it will effect a great saving.

Mr. Denison

Industry is, of course, always looking for faster and more economical ways to produce formed metal parts. Hydraulic presses are playing an increasingly important part. New techniques in the hydraulic press industry have brought about increased ram speeds and valves that offer versatile controls.

The working stroke of a hydraulic press, being uniform in speed and pressure, means that jobs can be accomplished on presses of much smaller size, bringing about reduced initial cost of the machine. The inherent advantages of hydraulic presses mean longer die life, reduced maintenance and better quality control.

Many of the products brought about by new industries are ideally suited to hydraulic metal forming presses. This is particularly true of parts for television and other electronics industries.

Problem of safety, for many years a serious one in all press shops, has been virtually overcome by the use of these presses. In addition, the danger of die breakage, caused by part misalignment or material pile-up in the dies, will not cause breakage of either the press or dies.

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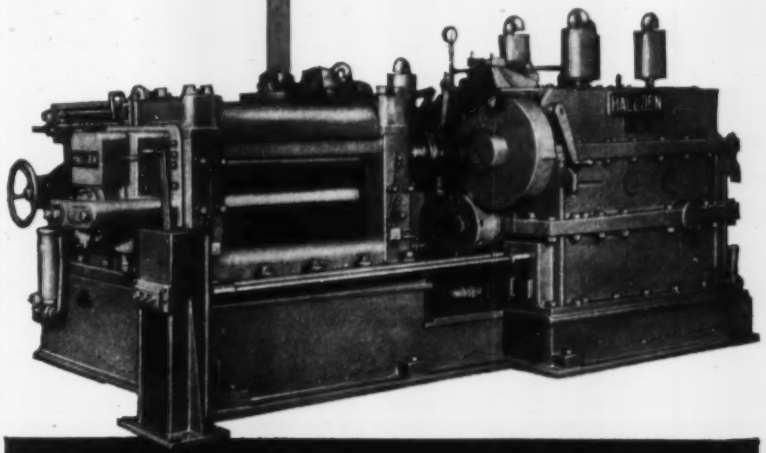

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TECHNICAL PROGRESS

Cleaning and Finishing

MANUFACTURERS will be getting out a better looking product in 1954. There is good reason: Market requirements are changing. Consumers are becoming more cost and quality conscious, asking for better finishes and a wider choice of colors and types.

Keystone of bright work is nickel plate, where the pinch still goes on, even though controls are officially off. Government officials admit that there won't be enough nickel for the civilian economy for a long time. With decontrol, electroplaters got rid of end use restrictions that limited nickel plating to a flash on many items.

There's good evidence that companies are planning for even more gleam on their products. Suppliers stand ready to do their share with improved plating machines and better baths. Past year saw announcement of three new nickel plating processes.

Manufacturers not dependent on plating to put the protective gleam on their products will find improved organic finishes and cost saving methods of applying them. Chances are good for finding a finish engineered specifically for the product. Early in 1954, for example, one supplier will get out a complete line of baking enamels to color-style air conditioners.

Improved cleaning and surface conditioning methods will help accent quality and efficiency angles. Mechanization of polishing and buffing, bulk tumbling and abrasive belts, also, are key factors in helping turn out better finishes economically.

Mr. Diggin

Developments of past year were numerous. At least three new bright nickel plating processes were announced the latter part of the year, in anticipation of the freer use of nickel in 1954. Alloy plating got a firm hold in the industry for strikes on castings prior to subsequent deposits, as undercoatings and for decorative and functional purposes. A large manufacturer of electro-metallic tubing switched from acid zinc plating to cyanide baths with an improvement in the product appearance and lowered over-all processing cost.

New automatic equipment for high production bulk plating made its bow during the year. This machine, with one man in attendance, can plate loads of 3500 pounds per hour and features automatic loading and unloading of the parts. Fully automatic conveyors were installed with much higher lifts and heavier load capacities than ever before accomplished. These conveyors can be adapted for uses other than plating, such as phosphating and similar chemical treatments. In line with modern trend toward automation, plating conveyors have been tied in with automatic loading and unloading devices for racked work.

Significant improvements are being made in low-voltage, dc-power supplies, particularly the selenium rectifier. Motor generators continue to hold their own; in fact, they have become more desired for uses where large amounts of dc current are required.

Mr. Cline

Coming year will see steel sheet and strip producers, processors and warehousemen using mechanical blast cleaning for descaling to a much greater extent than before. Metal cleaned mechanically by blasting is found to cold roll, cold draw and, in general, work better than pickled material. Mechanical descaling costs are materially less than chemical. Considerable savings result from steel conservation, since blast cleaning virtually eliminates any loss of metal, and all scale, plus steel shot abrasive used in its removal, can be recovered. A big advantage, too, is relief it offers from pressure brought to bear by the agencies governing stream pollution through waste pickle liquor disposal.

To the processor, it offers opportunity to reduce costs by cleaning hot rolled stock and eliminating pickling and oiling extra. It eliminates the possibility of hydrogen embrittlement. Also important is that mechanical descaling can clean material on the basis of current needs. Either intermittent or continuous operation is possible; there is no operating expense when the cleaner is shut down.

Field tests show that sheets as thin as 16 and 18 gage can be mechanically cleaned for as little as $2.80 per ton total cost, in contrast to the cost of pickling that is generally well above $4.00 a ton. Strip can be mechanically cleaned for $1.00 to $2.00 a ton, against $2.00 to $3.00 a ton for pickling.

Mr. Spring

Significant progress is being made on cleaners for three special applications which have plagued production men for many years. These are: 1. Process for removal of brazing fluxes; 2. Electrocleaner for zinc base die castings that does not etch, tarnish or discolor the zinc; and 3. Special property electrocleaners for use on steel and magnesium.

Brazing flux removal, a two step process, is most widely used in production of certain ordnance components. The zinc-base die castings cleaner is unique in that it is an effective cleaner in addition to its noncorrosive properties. It fills a gap previously met by the use of multi-stage processes. Special electrocleaners with surfactants are giving particularly good removal of certain obstinate soils.

Effort at laboratory stage in studying fundamentals of metal cleaning gives promise of new developments. One tool that has started to yield valuable information is soils containing radioactive tracers—course of cleaning can be followed with a Geiger counter. Accentuated emphasis on the role of the soil in the detergency process may lead to classification of soils, to permit more skillful selection of proper cleaners.

Mr. Swensson

Outlook for the hot-dip galvanizing industry for 1954 is optimistic. There is adequate steel production available, there is no shortage of zinc and the acceptance of hot-dip

MYRON B. DIGGIN
Technical Director, Hanson-Van Winkle-Munning Co., Matawan, N. J.

C. R. CLINE
American Wheelabrator & Equipment Co. Mishawaka, Ind.

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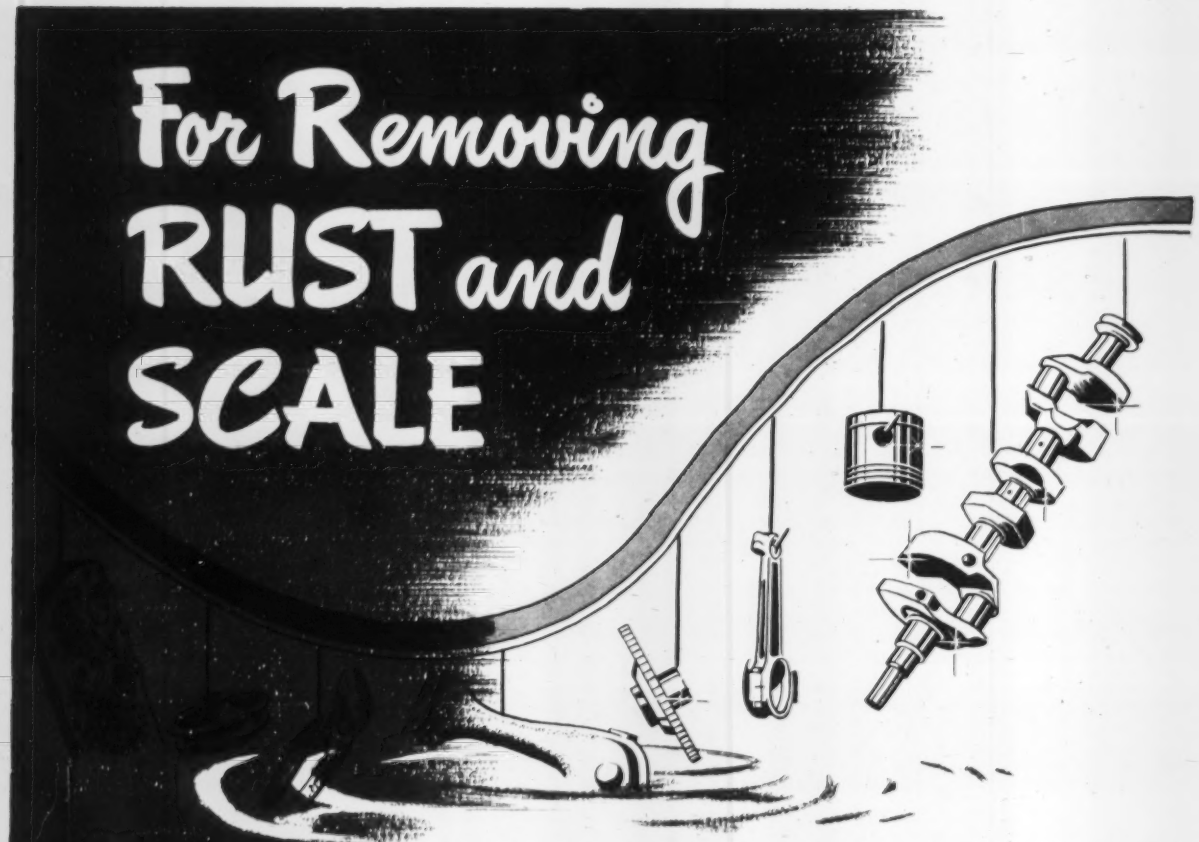
Inorganic Research Dept., Pennsylvania Salt Mfg. Co., Wyndmoor, Pa.

STUART J. SWENSSON
Secretary, American Hot Dip Galvanizers Assn., Inc., Pittsburgh

For Removing RUST and SCALE



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galvanizing as a good means of rust protection is receiving renewed attention by specifiers and buyers. These facts are backed by aggressive promotional activities of the American Hot Dip Galvanizers Association.

The Association is emphasizing quality control. The quality control committee has made some investigations to show the effect of controlled clean fluxing conditions on the length of life of hot-dip coatings. The committee is now considering tests on the pickling procedure to make these operations more efficient.

Realizing possibilities of expanding markets and bringing better rust protection services to its present customers, the Association's meetings are stressing a free exchange of experiences and technical know-how among the membership.

Mr. Carpenter

Greatest single step in metal cleaning during the past year in our opinion has been development of room temperature cleaners for production line work. Used in power washer, this type of cleaner combines detergency and wetting action, making it possible to remove processing oils and shop dirt from metal parts rapidly. A slight film is left on parts which protects temporarily against rusting. Parts may be left over a week-end before further operations without corrosion.

Cleaner is non-toxic, and parts coming through bath are not hot to handle or inspect. Saving is considerable, due to elimination of steam costs, stacks, hoods or exhaust fans. A hot air blast is sometimes used after the wash to dry up excess cleaning solution. Cold cleaning solution can replace volatile low-flash solvents used to clean parts being processed, thus contributing to plant

Plant safety, much discussed in recent months, has focused attention on practices that were not formerly considered particularly hazardous, such as use of open solvent tanks for slushing parts in process. Research is now being directed to development of still-tank cleaner that will be safe and efficient, without need for heat.

Mr. Meyer

Great interest is being shown in cleaning of aluminum, molybdenum, titanium and high carbon steels. New processes are used to prepare aluminum for resistance welding. They produce surfaces with uniform and consistent low contact resistance (less than 10 michrohms) with slow reoxidation rates. Such surfaces insure better quality of welds and facilitate production scheduling.

Use of alkaline descaling and desmutting solutions increased during the year. Solutions of this type are used for simultaneous cleaning, rust removal and plating whereby all three operations are done in one solution. Alkaline derusting and descaling is used to prepare high carbon steels for plating and phosphating. It finds extensive use in removal of carbonaceous and metallic smuts, such as are met with in alloy steels.

Chemical reduction plating, or so-called "electroless" plating, was improved and its use widened. Heavy coatings are being deposited with good corrosion resistance; coatings contain phosphorus as well as nickel.

Some of the difficulties in plating of powdered metal parts are overcome by "peen" plating. Powdered metals are tumbled with the parts, usually with an agent to give added pressure. Coatings of copper, brass and zinc are being applied to powdered metal parts. Process overcomes usual spotting out difficulties attendant with electroplating of such materials.

Mr. Duncan

A complete line of new baking enamels for the air conditioning industry will be marketed early in 1954. These coatings harmonize with the most modern interior decorating schemes and were developed to "color style" air conditioner exteriors in keeping with the growing importance of color harmony in the home.

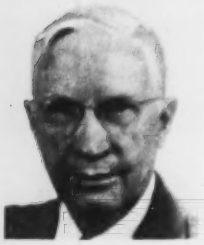
A new primer gives good protection with thin film; it has been used successfully as a one-coat finish on damp interiors of air conditioners. Nubelon S, an extremely hard yet nonbrittle silicone resin base finish, has found many new uses since its introduction less than a year ago.

Mr. Duke

Abrasive belts and rolls are becoming increasingly important to steel mills and fabricating plants. This trend is expected to accelerate in 1954 as a result of changing market requirements and continuing research into new applications for coated abrasives.

Research created the strip scouring application for abrasive rolls, and thereby helped solve problem of developing stainless steel trim for automobiles. As a result, many 400-series stainless strip producers are using strip scouring with abrasive rolls as an integral part of their production cycle.

Research also has made possible new applications, such as Scallop Edge belt for finishing jet turbine blades; cork belt for obtaining a higher luster on steel tubing; thick-coated belt for polishing hand tools, cutlery and surgical instruments; and a tool finishing belt and machine



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Inland Steel Co., Chicago

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Battelle Memorial Institute
Columbus, O.

R. B. SALTONSTALL
Udylite Corp.
Detroit

H. L. ALEXANDER
Electrochemicals Dept., E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

for the resharpening of carbide tools.

Another example is the way some producers have met foreign competition on high carbon strip for saw blades, razor blades and similar products. Coated abrasives were adopted for grinding, polishing and scouring the strip and enabled producers to meet both cost and finish of imported strip. Here's a new application to watch: Research evidence indicates that hot-rolled, pickled, mild steel can be flat polished to a finish comparable to a high commercial grade of cold rolled steel.

Mr. Lundeen

At present there are 14 continuous galvanizing units in operation in the U. S. Most of them start with a full hard coil which still has the roll oil on it. Unwinding coil is cleaned either by gas pickling, alkali cleaning with or without electrolytic action, or oxidizing the surface in an open flame furnace. After cleaning, unwound coil passes directly into a heating furnace where steel is normalized in a controlled atmosphere. In cleaning by heat, oxide formed is reduced in the heating furnace. After heating, strip is cooled in the same furnace to between 900 to 1000°F, after which it enters zinc bath through a sloping snout which passes from furnace directly into the zinc bath. After coating, strip is cooled in a cooling tower, followed by roller leveling, coiling or shearing and inspection.

In addition to units already in operation, there are several more which are being built. With the completion of these new units, the industry will have an annual capacity of well over one million tons per year in continuous galvanized sheets.

In some cases, continuous lines have replaced existing pot equipment; in others the new lines have been installed as additional equipment. Net over-all effect is that total galvanizing capacity of the country has been appreciably increased.

Mr. Faust

Looking for things to come in cleaning and finishing, we shall see more use of agitation by sonic to ultrasonic methods in both cleaning and pickling operations. Perhaps even in plating, too.

Slurry polishing will have much to offer for inexpensive finishing to good luster and smoothness. This is a process in which the work is rapidly moved in a heavy mixture of abrasive, supporting solid particles and lubricants or in which such a slurry is rapidly swirled around the parts. Smoothing by electrolysis is also gaining rapidly. Leveling electroplates, electropolishing and chemical polishing will be used.

Alloy plating is steadily growing. Tin-zinc, tin-nickel, bronze, nickel-zinc and chromium alloys are expected to find wide acceptance. Electrodeposition of aluminum for general use is getting nearer. Nonaqueous organic electrolytes offer new opportunities for electrofinishing processes. There is a pressing need for electroplates to give high-temperature protection to metals which have exceptionally good physical properties but inadequate chemical resistance at the high temperatures. Chromium alloys and aluminum electroplates are good prospects.

Mr. Saltonstall

There will be increased applications of radioactive tracer techniques to electroplating and allied metal finishing problems. We have not reached the practical limit of electrodeposition speed or perfection in appearance of bright deposits. Further progress undoubtedly will be made during the coming year.

Nickel, the metal which probably made most phenomenal progress in volume plated during the six years prior to Korean emergency, is still in short supply. However, in spite of the present discouraging supply picture, elimination of government controls on this metal have stimulated considerable renewed interest and activity in nickel plating. There is reason to believe that supply picture will gradually improve during the coming year.

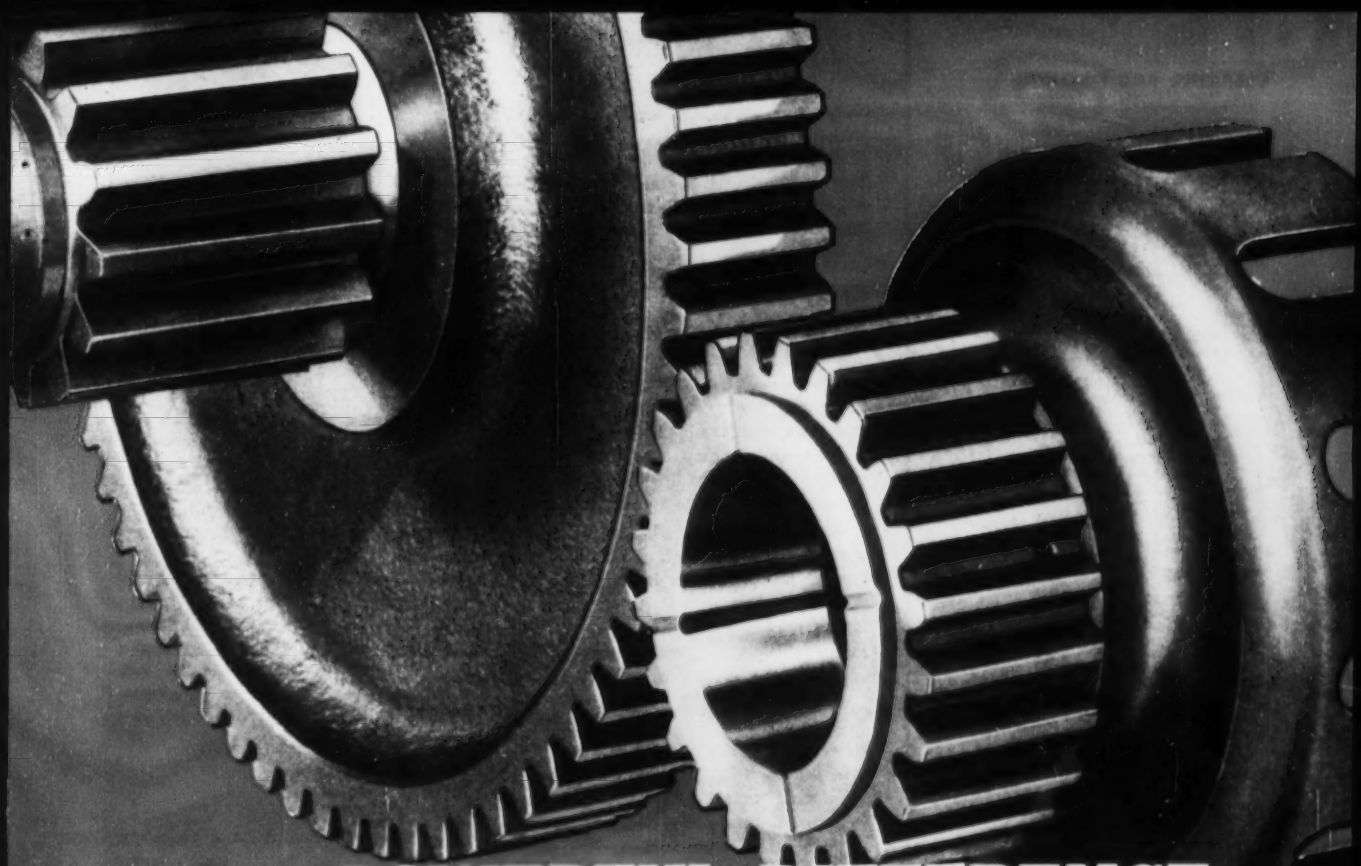
There will undoubtedly be continued emphasis on improvement in leveling (ability to hide polishing lines) and physical properties of bright nickel deposits. New methods of mechanical smoothing are currently undergoing extensive tests and will undoubtedly come into prominence in the near future. In plating equipment, a continuation of the trend toward fully automatic machines is expected.

Mr. Alexander

Use of sodium hydride descaling expanded significantly during 1953 in both existing fields and in new applications and 1954 should see its introduction into carbon steel lines. Most recent development in steel castings has been acceptance as cleaning method for removing last traces of sand from automotive steering gear pump castings. Fully automatic cleaning equipment is scheduled for early installation.

In forgings, sodium hydride descaling facilities have been expanded to cover several new items. Among these are jet engine blades, basic sections of articles designed to withstand conditions of severe exposure to temperature and wear, and heavy sections (up to 5,000-10,000 lbs) of hot pressed tubes. These are probably the world's largest tubes, manufactured in the largest shop of its kind.

Hydride descaling is used extens-



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Baltimore

ively for cleaning titanium sheet, without excessive loss of stock and without altering ductility. Unit for descaling stretch-formed sections is scheduled for installation in one of the large aircraft plants in early 1954.

Mr. Tebben

Perhaps one of the most significant achievements in cleaning is a new process of cleaning and pickling stemming from research in Germany and this country. Process is electrolytic and employs periodic current reversal to attain in one operation results which formerly required two.

Great strides are being made in plating. Curtailment of critical materials has resulted in development of new electroplated alloys, such as tin-zinc and tin-nickel, which offer many advantages over coatings accepted as standard for many years. A new hard chromium process is available that makes possible precision plating to tolerances never before realized. A new, fully-automatic plating machine, now thoroughly tested in production, has but two reciprocating movements. It eliminates many complicated motions that have been accepted as necessary in previous machines.

Mr. Hogenson

Past year saw relaxation of government controls on a number of critical metals, including cobalt, one of the most important to porcelain enameling. As a result, the industry today is returning to a more normal supply situation far as certain frits are concerned.

Considerable advancement has been made in color. Tint-Taniums, which a year ago held great promise in the production of bath tubs, sinks, architectural installations, refrigerators and holloware, today are being used in production. These enamels are titanium cover coats with pastel color built in.

Another important development is the alkali resistant quality incorporated into several new frits. This is particularly significant to the washing machine tub and sink field and assures consumers of a better coating to meet the service conditions to which these products are exposed.

Mr. Aloi

There has been a steady growth in continuous galvanizing of sheets in this country since the process was first introduced on a commercial scale in Europe in the early thirties. Currently, about a dozen lines are in full operation, with several more expected to be ready to go within a year.

This growth is the result not only of the trend in the sheet industry toward continuous processing but also of improved quality of the continuous galvanized product. Chief among these improvements over the older hot-dip process are a more uniform and tightly adhering zinc coating; and, as a consequence of the continuous annealing in line, a more uniform grain structure in the base metal. Product combines good ductility in both base and coating metals, with slightly higher strength or stiffness, and is well suited for stamping and difficult forming operations.

Another attractive feature: Availability in coil form, which makes possible substantial savings in scrap and in handling labor to consumer. There is no question that in near future the major tonnage of galvanized sheets will be produced on continuous galvanizing lines.

Mr. Mitchell

Increasing demand for a black finish on stainless steels has resulted in processes which produce a desirable black coating on stainless steels, cast and malleable irons in a water and salt mixture at low temperature ranges. This finish is used where a decorative, or a nonreflective surface is required.

Blackening solution is made up by dissolving a salt mixture in water to obtain a concentration which will boil at the operating temperatures of 240° to 270° F. Concentration is then maintained by addition of water either manually or by automatic temperature controller to replenish that lost through evaporation.

Mr. Irvin

Industrial awareness of protective value of chromates against corrosion has grown tremendously in recent years. Earlier uses were considered somewhat speculative; but over the last ten years, more and more applications have had time to prove the merits of this economical and simplified metal finishing process.

Much research is being carried on to expand the science of this chemical treatment; original use was limited primarily to zinc and cadmium. At present, chromates are used in finishing copper, brass, bronze, aluminum and magnesium, in addition to zinc and cadmium. There are other factors of industrial value, aside from corrosion resistance, resulting from further processing of these metals—such as, weldability, electronic prop-

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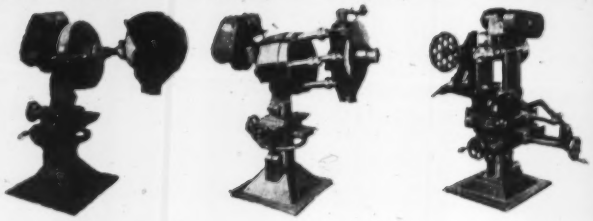

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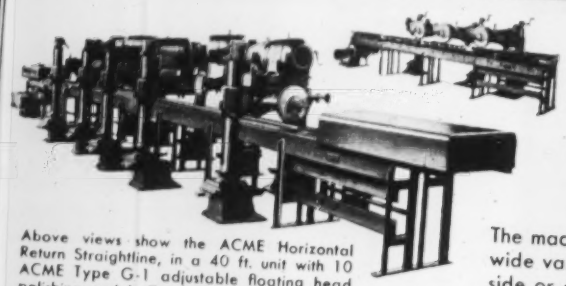

Above views show the ACME Horizontal Return Straightline, in a 40 ft. unit with 10 ACME Type G-1 adjustable floating head polishing and buffing lathes . . . and a 20 ft. unit with 3 ACME Type G-3 lathes.

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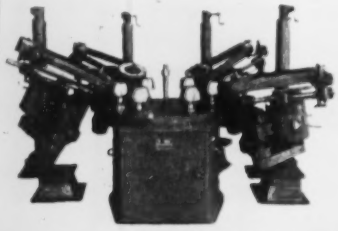

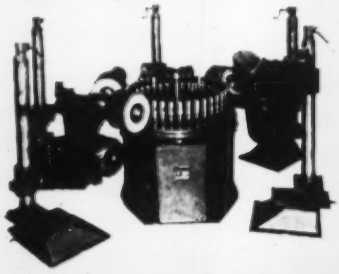

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erties, forming and painting.

Aside from continuous research on other nonferrous metal chromate treatments, much work is being done on iron alloys, including cast iron, steel and stainless steel. Development work to expand use of chromates in the basic rolling mills is being carried forward with good prospect of wide supply of chromate treated metal from the mills in the foreseeable future.

Mr. Lux

Despite advantages of mechanical metal cleaning equipment there are certain limitations in flexibility after equipment has been installed. This is leading to more thorough study of cleaning operations and variations in types and quantities of soils that must be removed. As a result, process engineers may be expected to continue to demand that cleaning equipment and materials be designed with sufficient factors of safety to insure the necessary surface cleanliness, despite radical variations in the condition of parts to be cleaned.

Importance of pre-cleaning prior to final cleaning process is being better recognized as more engineers see over-all savings and reduction in rejected parts that this extra operation makes possible. In all cleaning operations, wider application is being made of automatic controllers to maintain proper operating temperatures and concentrations to insure efficient cleaning.

More progress can be expected in development of metal cleaning materials that will protect parts from corrosion between operations. Metal finishing cannot stand cost of re-processing parts that rusted or corroded between operations or inspections. Increasing practice of air-conditioning metalworking plants doing precision work will increase demands for metal cleaning materials that can be used at room temperature, so that the load on the air conditioning equipment is minimized.

Mr. Bryant

Corrosion resistance of porcelain enamel has long been considered as a solution to the production of hot water tanks. Use of larger volumes and higher temperature water in the home has focused more and more attention on the problem and new enamels have been developed that are superior in their resistance to corrosion by hot water.

In the domestic appliance field, there is definite desire for color to replace some of the white that has been the standard finish. Reproduction of colors in porcelain enamel requires closer control and is more of a problem than the production of white. However, materials are available which will allow the production of desired colors. Color-fast and weather resistant finishes on aluminum as produced by special types of porcelain enamel and special processing fill a long felt need in the use of aluminum for decorative purposes.

An all-purpose ceramic coating for all heat resistant applications has been shown to be impractical. In this field, it is necessary to select coatings from the numerous ones available, since each combination of coating and base metal is an individual problem.

Mr. Steck

Paints formulated from Epon resins are now used by virtually all manufacturers of washing machines due primarily to their unusual resistance to alkalis, detergents and other corrosive agents. Towards the end of 1953 Epon resin finishes were being specified for ever widening application by most other branches of the appliance industry, from air conditioners to refrigerators, all seeking more positive means of corrosion prevention. Spraying, dipping and flow coating methods are used.

In addition to appliances, Epon resins are finding wider application in many other fields, from air drying floor varnishes and trim paints to wire enamels, baked container linings for corrosive chemicals and can and drum liners for foods and other products. Exceptional flexibility and high resistance characteristics are points that justify use of the new resins.

Protective maintenance and prevention of corrosion to structural plant, processing equipment and outdoor installations is more effective through the use of surface coatings, both air drying and catalyst dried, based on Epons. In 1954 we expect increased consumption of these resins by paint producers to meet established application demands and growing requirements for new applications.

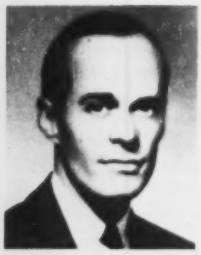
Mr. Cook

New method of continuously galvanizing sheet and strip, opens up new markets in certain formed and fabricated items not possible with the product of present coating lines. Process provides a smooth, bright, uniform coating of zinc that is more ductile than the base sheet. Unlike conventional galvanizing lines, the new coating process is separate and apart from annealing and sheet processing operations. Galvanized sheets have forming and drawing capabilities previously obtainable only in uncoated cold rolled sheets.

Extensive tests show that new product maintains the bright, characteristics of the zinc coating for a long period of time under all but the most severe conditions. It can be furnished to resist storage discoloration indefinitely and can be painted without the pre-treatments now required

WILLIAM P. INNES
Technical Director
MacDermid Inc., Waterbury, Conn.

P. R. HENDRIXSON
Electrochemicals Dept., E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.



WALTER GEORGE SEE
President, Submerged Combustion Co. of America, Hammond, Ind.

WALLACE G. IMHOFF
President, Wallace G. Imhoff Co.
North Highlands, Calif.

on the conventional type of sheets.

In addition to new uses in forming and manufacturing fields, new product may also be the steel industry's answer to threat of nonferrous materials for roofings, sidings, duct work and interior paneling where ease of fabrication and appearance are of importance.

Mr. Innes

We have developed a chemical polish for most of the commonly used carbon and low alloy steels. Known as "Mirrofe" the process produces a brilliant finish on steel by simple immersion, usually for ½ to 2 minutes at room temperature. Solution can be handled with standard equipment available in most finishing departments.

In addition to imparting a brilliant luster to steel, the process also gives leveling or smoothing properties similar to electropolishing. Because of this characteristic, it is possible to improve the corrosion resistance of plated articles without increasing the thickness of the plate. Increased die life is also expected due to reduced friction as a result of this leveling action.

The solution is being used for deburring small precision gears, bulk dipping of steel articles to supplement tumbling and burnishing prior to plating and chemically polishing articles such as drills. In addition, it has application in micromachining of parts to uniformly remove metal.

While the development is not expected to replace mechanical polishing, it does have specific application such as for bright dipping deeply recessed work which in general is difficult to polish or burnish. It also has supplemented mechanical polishing to increase production due to the use of less man hours and equipment per unit output.

Mr. Hendrixson

Use of degreasing equipment and solvents (trichlorethylene and perchlorethylene) remained at consistently high levels throughout 1953. This can be attributed to the continuing expansion of the vapor degreasing process.

Such progress reflects superior versatility and life built into present day standard degreasers. Greater solvent economy and ease of work handling are being furthered by increasing use of conveyorized units. Improved vapor seals and spray cleaning action on automatic degreasing machines permit increased work throughout while holding solvent consumption to minimum. The newer metallic and plastic interior degreaser coatings are being used to extend the serviceability of machines, particularly the standard manual models. Refinements in standard design are contributing enormously to excellent performance now being realized where metal cleaning is required in processing, inspecting and testing operations.

Ultrasonic degreasing systems have been found useful in removing stubborn soil from small, intricate parts. Problem of scaling up such systems to handle larger parts is a matter of intensive study. Even with present limitations, however, application of ultrasonics for metal cleaning is proving well worthwhile.

Mr. See

Submerged combustion equipment is in use for pickling steels in all types of acid solutions. Design of equipment permits use of this direct fired method in hydrofluoric acids and other mixtures that are normally impractical to heat with steam because of solution corrosiveness.

Economies gained by direct firing are many. There is no dilution. Because of exhaust gases being bubbled through the solution, there is a constant concentration of the acids as well as a heavy agitation, which maintains a constant temperature throughout any size vat and also increases pickling speed.

Mr. Imhoff

Continued effort was exerted during past year by hot dip galvanizing industry to improve facilities for mechanical drossing. Handling of dross with a dross pump was demonstrated, and continued efforts are being made to develop a conveyor type machine.

In field of combustion engineering, as applied to heating galvanizing pot, improved heat application has resulted in longer pot life. New bath coverings are being offered to prevent heat losses from the galvanizing bath. Perhaps the most important thing in 1953 is the dis-

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H. L. BENNER
Electrochemicals Dept., E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

ROBERT A. WEAVER, JR.
President, Bettinger Corp.
Waltham, Mass.

F. W. NELSON
Asst. Director, Ceramic Research and Development, A. O. Smith Corp., Milwaukee

R. C. GIBSON
Technical Director
Parker Rust Proof Co., Detroit

covery of how to eliminate the zinc-iron alloy, dross, entirely from a hot dip galvanizing bath.

Mr. Benner

In 1954 there should be a surge of growth in the electroplating industry approximating the expansion that occurred about ten years ago. The research efforts of suppliers of chemicals and processes have effected noteworthy improvements in practically all types of plating baths, enabling users to select processes tailored specifically to their needs.

Zinc deposits are plated fully bright and kept so for extended periods by means of brightening and passivating treatments, thus extending the usefulness and attractiveness of these coatings. Extensive research on cyanide copper plating has resulted in specialized baths for fully bright deposits, leveling ability, easy buffing and better plate distribution. Improved nickel, chromium, silver and gold plating baths are offered.

Industry is making increasing use of operating refinements, such as diaphragms to control roughness of deposits, special current techniques, higher rates of solution circulation with air pumps, that have been developed to improve plated coatings.

Make-up of large cyanide copper plating baths is facilitated in some cases by shipment of solution concentrate in tank car quantities. This minimizes labor of handling large quantities of the separate bath constituents and reduces the possibility of errors in make-up.

Mr. Weaver

Cleaning process used by us in coating stainless steel with high temperature ceramics is unique to the enamel industry. Not only was it necessary to devise special equipment to contain and handle the highly volatile acids used (strong solutions of hydrochloric at 180° F and nitric plus hydrofluoric at 200° F) but new methods of neutralizing these acids also had to be developed.

Ordinary neutralizing solutions were found unsatisfactory for removing all traces of acids. One hundred per cent neutralization, which is absolutely necessary to promote coating adherence, is obtained only by intense heat used with a sodium carbonate neutralizer. Parts are subjected to a temperature of 1850° F for a flash neutralizing after the carbonate bath.

Mr. Nelson

Manufacturers of jet engines find that high temperature ceramic coatings are effective in extending metal life and, in some cases, permit the substitution of metals with lower alloy content. These high-temperature, ceramic coatings are also applicable in a variety of civilian industries, such as refineries, chemical plants and other processing industries where elevated temperature conditions are encountered.

Porcelain enameled steel and aluminum architectural panels are ideal for use in curtain wall construction. Advantages over masonry type construction: Light weight, thinner, increased durability and weather resistance, practically no maintenance and a wide selection of colors.

First industrial glass-coated smoke stack was erected in 1953. The interior and exterior surfaces of the steel stack are coated with an acid resisting glass. It is expected that glass-coating will double the life of ordinary industrial steel stack.

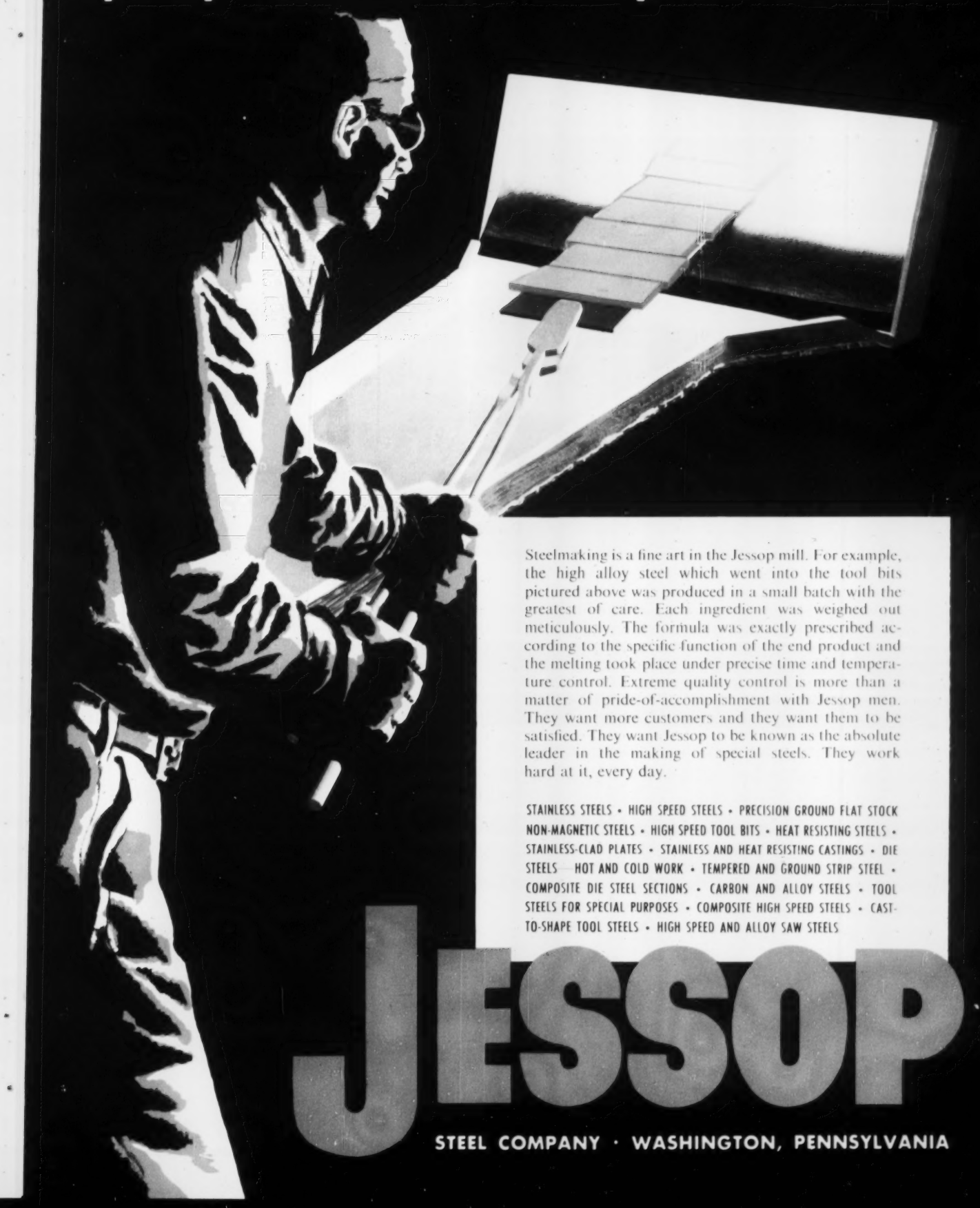
Mr. Gibson

Advantages of phosphate surface treatment are now extended to structural steel and custom fabrication fields by development of a new pigmented metal conditioner. It is a single coat material which may be used by brush, spray gun, or dip on steel and zinc coated steel prior to application of paint finish systems. It is useful for railroad rolling stock, truck and trailer bodies, tanks, signs, structurals, such as bridges, derricks and girders, and automotive repaint shops.

New pigmented phenolic resin finishes for phosphate coatings are also arousing interest. An intense black finish and a light silver finish with the appearance of aluminum have been developed. Extensive laboratory and field tests indicate that corrosion resistance of these finishes is approximately double that of conventional oil finishes now in use. They are applied by centrifuge and give good color and eye appeal.

A thin iridescent Bonderite coating gives protection to unpainted

quality steel is more than pride at JESSOP



Steelmaking is a fine art in the Jessop mill. For example, the high alloy steel which went into the tool bits pictured above was produced in a small batch with the greatest of care. Each ingredient was weighed out meticulously. The formula was exactly prescribed according to the specific function of the end product and the melting took place under precise time and temperature control. Extreme quality control is more than a matter of pride-of-accomplishment with Jessop men. They want more customers and they want them to be satisfied. They want Jessop to be known as the absolute leader in the making of special steels. They work hard at it, every day.

STAINLESS STEELS • HIGH SPEED STEELS • PRECISION GROUND FLAT STOCK NON-MAGNETIC STEELS • HIGH SPEED TOOL BITS • HEAT RESISTING STEELS • STAINLESS-CLAD PLATES • STAINLESS AND HEAT RESISTING CASTINGS • DIE STEELS — HOT AND COLD WORK • TEMPERED AND GROUND STRIP STEEL • COMPOSITE DIE STEEL SECTIONS • CARBON AND ALLOY STEELS • TOOL STEELS FOR SPECIAL PURPOSES • COMPOSITE HIGH SPEED STEELS • CAST-TO-SHAPE TOOL STEELS • HIGH SPEED AND ALLOY SAW STEELS

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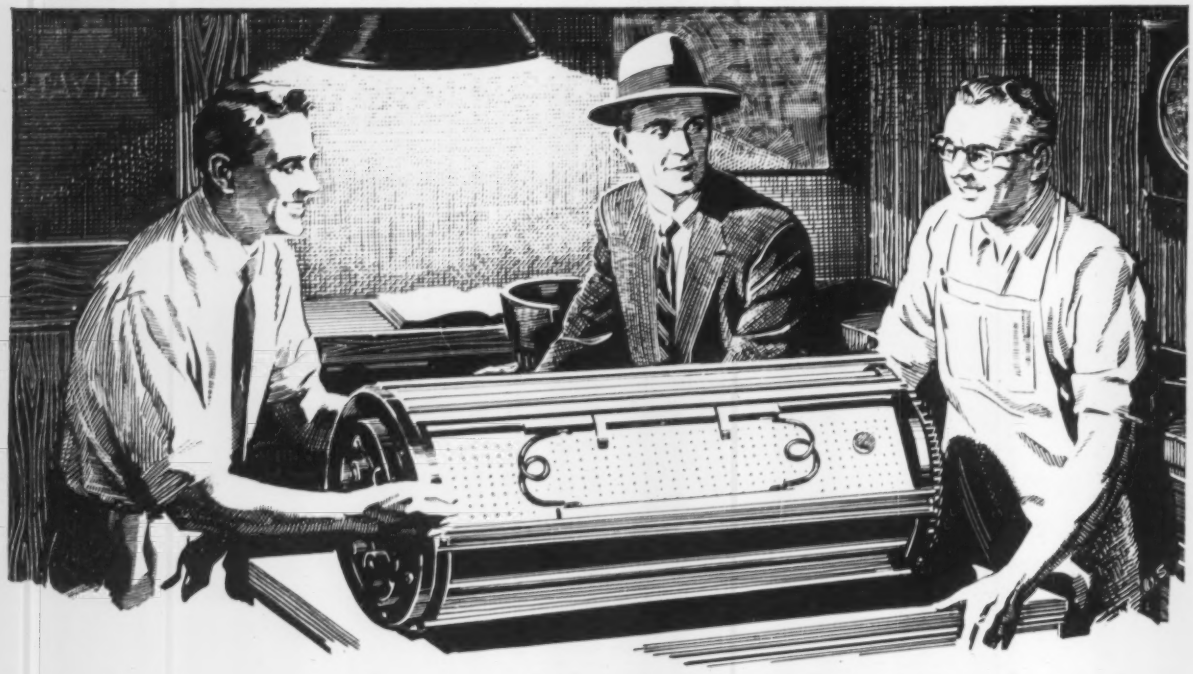
ONE OF A SERIES OF ADVERTISEMENTS ON THE HISTORY OF ELECTROPLATING



a midnight sale that opened **the door to new plating profits**

Back in 1934, Udylite's young president, L. K. Lindahl, threw the necessary parts for a complete plating barrel into his car and headed for Kokomo, Indiana. He arrived at midnight. His prospective customers — a plating shop owner and the superintendent—were waiting for him.

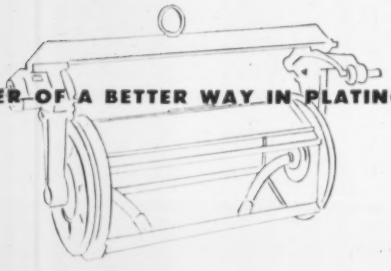
On the shop owner's desk, Lindahl assembled, disassembled and reassembled the barrel. It was a perfect machine fit of parts picked at random from stock. It was the first barrel providing perfect assembly of standard parts! Easily removable panels and other superior features of the barrel completely sold both men. Udylite got the order!

The months of research by the Udylite technical team had paid off! The barrel was unique because it was made from a material heretofore untried . . . hard rubber. In addition, electricity was conducted through the ends of the barrel by easily removable contacts. This first Udylite Barrel had again provided *a better way* in plating.

Udylite knew they had the best unit in the industry —one that upped production, cut costs, saved manpower. But the "midnight sale" proved the acceptance and value of this revolutionary product.

In the following years, Udylite Corporation continued to pioneer improvements and innovations in plating barrels. Bakelite, hard rubber and melamine materials were followed by the present super-resistant lucite plating cylinders. But that's not all! Udylite engineering and research teams are constantly at work perfecting still better materials, methods and equipment . . . all designed to give you better plating at lower cost.

PIONEER OF A BETTER WAY IN PLATING...



THE Udylite CORPORATION
DETROIT 11, MICHIGAN

T. J. KEARNEY
Chief Engineer, Detrex Corp.
Detroit

A. J. DIEBOLD
President, Hanlon-Gregory Galvanizing Co., Pittsburgh

aluminum and also serves as an ideal base for paint systems. No applied electrical power is needed. Coating is flexible, can be arc and spot welded, produces no appreciable change in dimensions and has good resistance to bi-metallic and galvanic corrosion. It is applied equally well to sheets, castings, forgings, extrusions and structural forms of aluminum and its alloys.

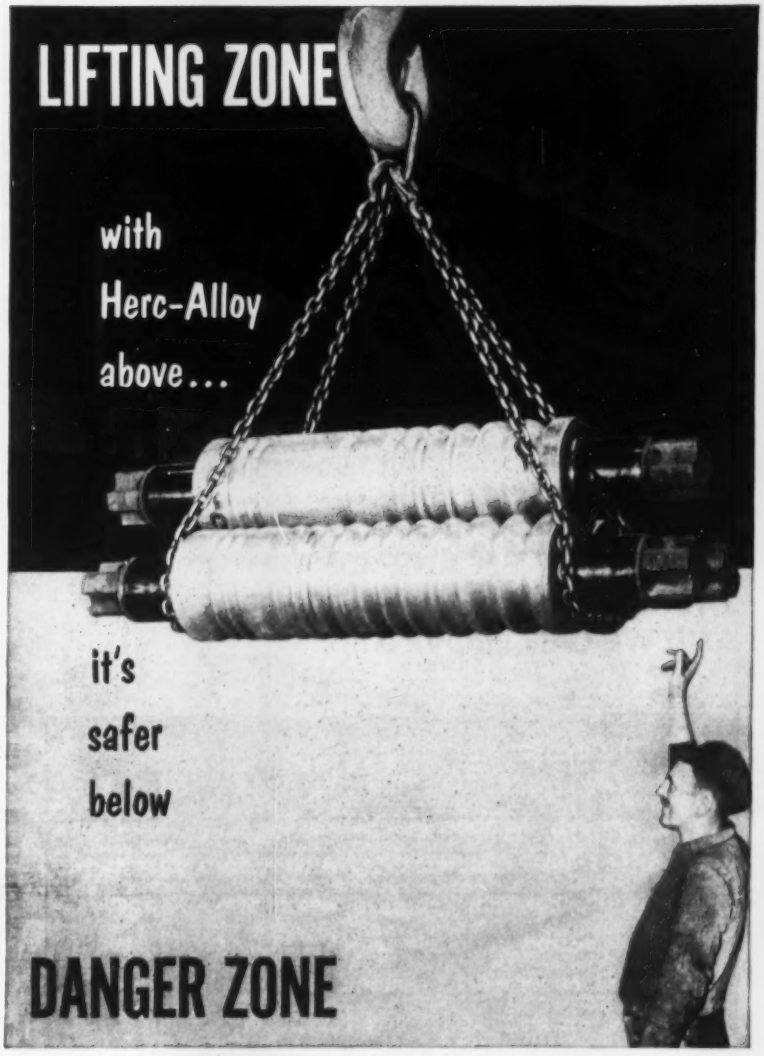
Mr. Kearney

During the past year, high production ultrasonic metal cleaning equipment was built capable of cleaning five to eight thousand parts per hour. Incorporation of sound energy, in combination with conveyorized chlorinated hydrocarbon degreasing equipment, gives a degree of soil removal heretofore unobtainable. Results are particularly important in final cleaning of precision finished surfaces such as obtained by lapping or honing.

Most applications of highly finished parts demand the ultimate in soil removal. Recent advances made in metal cleaning by utilizing high frequency sound waves in a complete degreasing unit supply this demand.

Mr. Diebold

Corrosion is the arch destroyer of iron and steel products, claiming a



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The Allegheny Ludlum Steel Corp., pictured above, uses Herc-Alloy Sling Chains for hundreds of tough lifting jobs in its plants. In addition to maximum safety, Allegheny Ludlum also enjoys the extra economy of longer-lasting Herc-Alloy. These sling chains offer still another advantage...a weight reduction unmatched by any other alloy chain without any sacrifice in tensile strength. This reduces worker fatigue. All things considered, don't you think Herc-Alloy Sling Chains are worth a try in your plant.

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Washington Steel CORPORATION

WASHINGTON, PENNSYLVANIA

RICHARD O. LOENGARD
President, United Chromium, Inc.
New York

toll of many millions of dollars each year. Man is constantly combatting the expense of rust.

Here are four reasons why hot dip galvanizing is an effective corrosion preventive: First, zinc is low in the electromotive series and will sacrifice itself and save the steel from rust. Second, zinc is relatively low in cost. Hot-dip process makes it possible to apply a heavy coating economically.

Third reason: Necessity for replacement is far less frequent, if at all, where hot-dip galvanizing is used. This is the main reason why zinc coating by hot-dip method is economical. Fourth, zinc coating is continuous. There are no pores open for moisture to enter and corrosion to start.

Our confidence in hot-dip galvanizing has led us to expand our facilities by building an additional plant to handle not only a larger volume of steel products, but also products of unusual design and shape.

☑ Mr. Loengard

One of the immediate factors in metal finishing is the prospect that more nickel will be available for the plating industry and that restrictions on its use have already been lifted. In England, where such restrictions were lifted earlier, there has been an almost uniform return to the use of the pre-Korea coatings and a discontinuance of the use of substitute coatings.

Nickel plating generally has been in the forefront this year with the offer of many new processes, both electrolytic and non-electrolytic. We can look forward in 1954 to the appearance of additional processes which have been developed as a result of research.

Similarly, new organic coatings will

Q What can we do to step up production on our grinders and produce better work?

Q What will give us *fewer rejects* on our castings?

Q We need a drawing lubricant that will help speed up bar drawing and produce the desired surface finish.

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If such operations are giving you trouble, the Houghton Man may well have the answers you need—or can get them for you with the help of our research staff "back home".

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Model SL50-8/4-45

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- When pre-set percentage of stretch is reached, machine automatically stops so stretching cylinder can be unloaded and grip jaws opened to release workpiece.
- Machine can be set from extreme length of 45 feet down to 10 feet in 30 seconds.
- To facilitate rapid setup for various lengths, output head is equipped with gear motor, and holding pins are extended or retracted automatically by an air cylinder that is push button operated.
- Both gripping heads are mounted on anti-friction roller bearings. Additional rollers on bottom of heads prevent "kickup."

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H. R. SUTER
Director of Application Research, Wyandotte Chemicals Corp., Wyandotte, Mich.

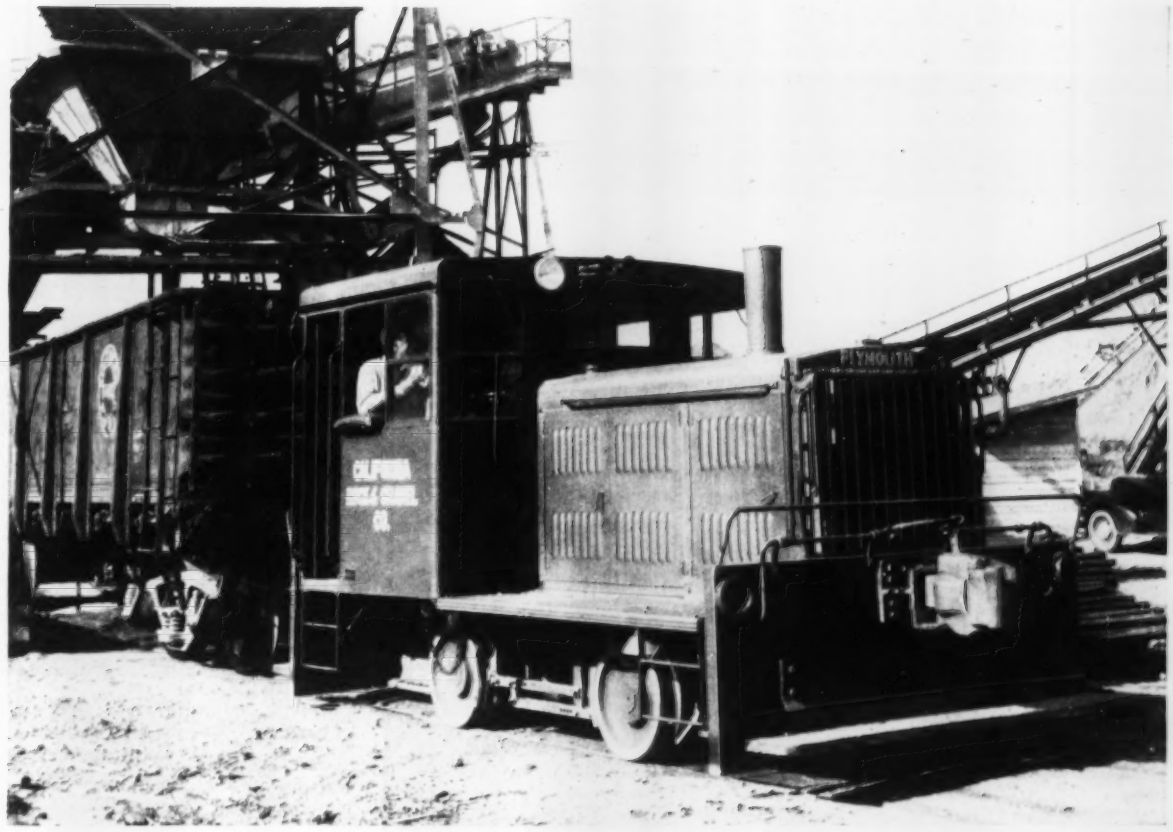
become available as continued research makes possible both new coatings and new applications of old coatings. Certainly, both here and abroad, interest in improved processes and materials for metal finishing shows no sign of abatement and the metal finishing industry has in prospect a busy and highly active year.

Mr. Suter

The disastrous fire at Detroit transmission plant of General Motors Corp. has focused attention of plant engineers on safety aspects of cleaning operations. In particular, this is centered on flammable solvents that are being replaced by aqueous systems where possible. To increase margins of safety, higher flash point standards are being enforced for hydrocarbon solvents used for dilution of emulsion cleaners.

Substantial progress has been made in improving deflocculators for use in water-wash, paint-spray booths. A new product developed in our laboratories during the year is bearing out its original promise of applicability to a wide variety of finishes. It kills the tackiness of over-sprayed paint, and allows it to float on the surface of the water in the accumulator tanks, where it is removed by skimming. Maintenance of booths is reduced by prevention of sludge accumulation on water curtains and in tanks, lines and sewers.

Improvements in effectiveness of alkalined detergents for soak cleaning, electrocleaning and for use in power washers have been made by use of newly developed synthetic surface active agents. One group is based entirely on propylene and ethylene oxides, and the composition and performance properties are variable over a wide range.



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*Torqomotive Drive: Plymouth transmission with hydraulic torque-converter.

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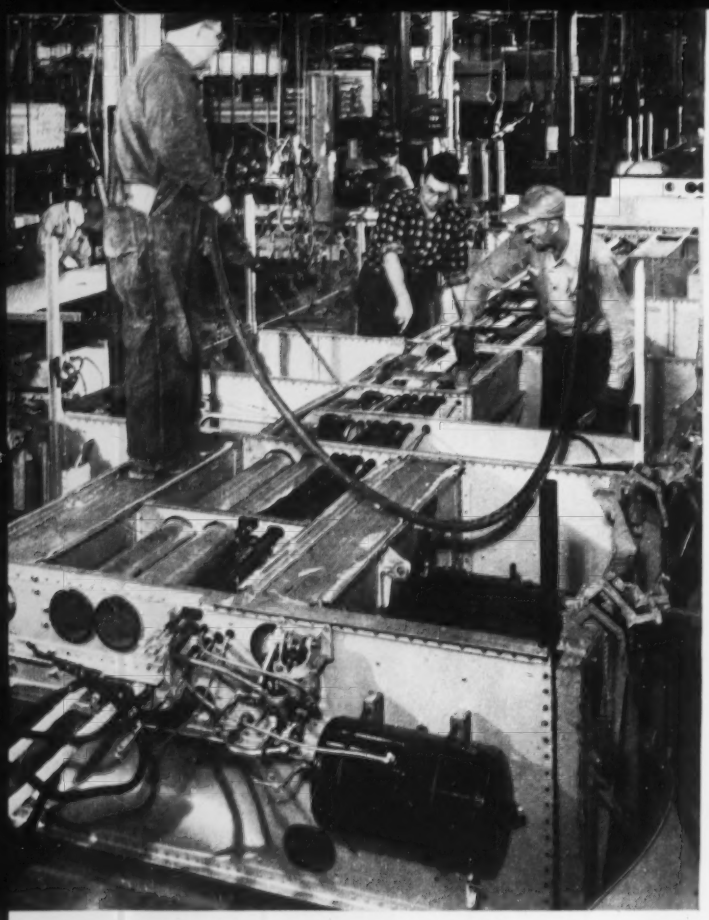


TECHNICAL PROGRESS

Joining

WELDING speeds took another jump upwards last year with the automatic submerged arc machines laying down upwards of 200 inches per minute. Better power sources and twin welding heads should up that rate to 300 ipm, and look for increasing use of this process in the thinner gages. Inert gas-shielded methods will continue their advance into various metals and thicknesses; some interesting results are reported on cost comparisons and alleviating porosity problems. Stick electrode welding stands to gain, too, with low-hydrogen rods and easy-stripping fluxes.

There is no reason to believe that brazing has even sighted the end of its development road. Scope now includes aluminum and magnesium brazing and applications include parts for 2000° F service.

Adhesives are moving into structural uses requiring strengths heretofore obtainable only with welding or mechanical fasteners. Epoxy resin based materials are giving shear strengths up to 4500 psi. Prime research target today is reducing cost and curing time, temperature and pressure.

Job-engineered fasteners hold the key to many production bottlenecks. Devices incorporating as many as a dozen parts in one are producing startling economies on assembly lines. A number of companies are set up to design fasteners for your particular needs.

☑ Mr. Davis

Use of automatic welding equipment has increased some 500 per cent in the last ten years. Its use is still rapidly spreading and will continue to do so. Reason for this increased use of the automatic process is the potential cost reduction in manufacturing that is inherent in it. The uniformly excellent weld quality obtained at high welding speeds reduces welding costs. New developments in automatic welding equipment and materials promise new cost reducing possibilities.

Equipment for adapting standard welding heads to use two small wires rather than one larger wire and hence weld with two arcs, increases welding speeds up to 50 per cent. Welding set-ups have been made to run two separate welding heads in tandem, achieving high welding speeds, but frequently the two-head tandem set-up calls for a complex control circuit and extensive capital equipment. The use of two wires and two arcs with a single head simplifies both control and equipment.

☑ Mr. Gausebeck

Significant gains have been made in the adhesives used in all-metal honeycomb sandwich construction most widely used in the aircraft industry. New tape adhesives, consisting of loosely woven glass or cotton fabric impregnated with the adhesive, are used to obtain dry adhesive films of the proper thickness. Their main advantage lies in reducing processing steps since the successive application of several adhesive coatings with a drying step between is eliminated.

Epoxy resin based adhesives, vinyl-

and Assembly

phenolic, neoprene phenolic and rubber phenolic adhesives are considered best for metal to metal bonds. Shear strengths up to 4500 psi can be developed with high temperature cures (up to 350° F). Adhesives based on epoxy resins are available in paste, powder and rod form for ready use in such applications as bonding fin tubes on heat transfer equipment and other metal to metal bonds.

Reduction in cost of high strength adhesives is a major item in today's adhesive research. Other improvements under development include higher strength at high temperatures, longer working life, higher impact resistance, particularly at low temperatures and reduction in curing temperature, time and pressure.

Mr. McElrath

Porosity in weld metal has been the chief deterrent to a fuller utilization of shielded inert gas metal arc welding process on carbon steel. A comprehensive program developed significant information during 1953. Test results correlated the porosity-forming tendency with the carbon and silicon contents of the base plate for butt welds, and with surface cleanliness for fillet welds. In effect, this information made it possible to predict the weld quality obtainable on various steel grades.

A "whipping" technique (rapid, longitudinal oscillation of the torch along the joint) resulted in remarkable reduction and in some cases elimination of porosity in troublesome steel compositions. In addition, use of specially deoxidized experimental wire was found to eliminate porosity completely on both butt and fillet welds with any welding technique used.

Sigma welding of carbon steel is expected to expand rapidly during 1954 on steels rated readily weldable with "standard" filler wires. Development of improved wire compositions will be continued for economical use of the process on any grade of steel, with weld quality satisfying code requirements.

Mr. O'Brien

Titanium with its high strength-to-weight advantage over aluminum and steel, and the possibilities of tremendous weight savings on applications below 800° F, is being considered and used for many applications throughout the metal fabricating industry.

Its lighter weight, which is only 0.56 that of steel, tensile strength as high as 175,000 pounds per square inch in alloys of titanium, excellent corrosion resistance, and fatigue behavior, and the abundancy of titanium as compared to the short supply of certain alloys required in stainless steel are all factors that enhance its future. They pressure the welding industry into developing better and faster methods of joining this metal.

One of the better and faster methods of joining titanium is induction brazing, where the metal's high electrical resistivity—60 micro-ohms per centimeter—and low thermal conductivity, and co-efficient of expansion, allow us to localize the uniform induced heat and effect brazes in a matter of seconds without distorting the assembly. Several factors must be taken into consideration when induction brazing a highly reactive metal like titanium—using the proper brazing alloy and flux, cleanliness of the braze surface, and fit are the most important.

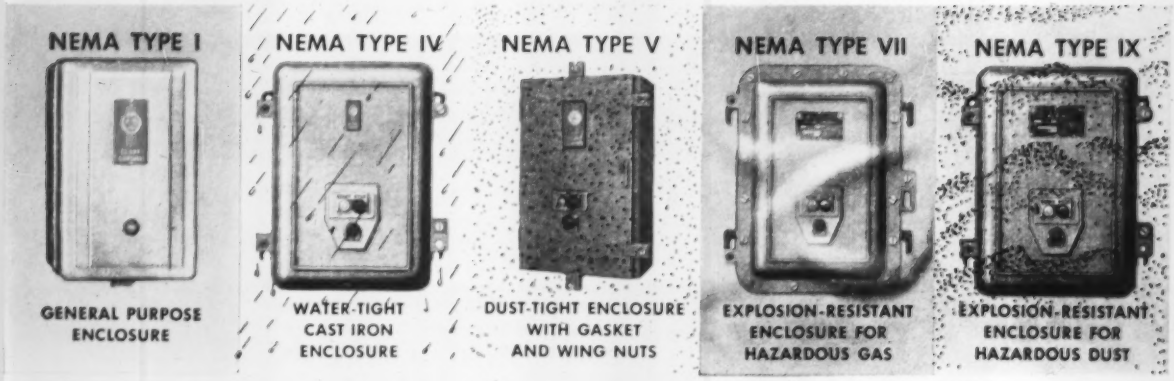
A strong ductile braze can be

A. F. DAVIS
Vice President, Lincoln Electric Co.
Cleveland

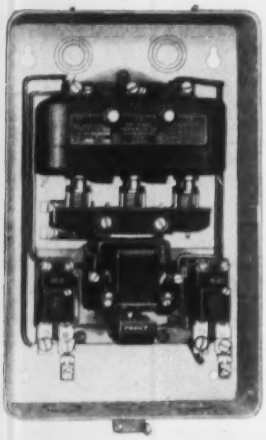
HERBERT GAUSEBECK
Assoc. Mgr., Chemical & Chemical Engrg.
Armour Research Foundation, Chicago

T. McELRATH
Development Engineer, Linde Air Products
Union Carbide & Carbon Corp., New York

THOMAS J. O'BRIEN
Vice President and Sales Manager
Weltronic Induction Heating Corp., Detroit



for every operating condition
use CLARK TYPE "CY" STARTERS

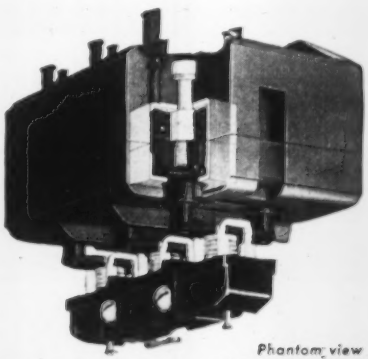


In every industry, including those where hazardous atmospheres prevail, CLARK TYPE "CY" STARTERS are giving utmost satisfactory service.

The incomparable new multi-turn magnetic blowouts combined with twin-break contacts, and the rest of the operating mechanism, are enclosed in types of cabinets to protect against adverse conditions or dangerous atmospheres.

Type "CY" starters, Sizes 2 and 3, employ an entirely new principle of arc interruption. The arc is extinguished by the effect of the blowout coil, concentric with the contact. The magnetic field quenches the arc either by lengthening or confining it. In its forced rotation it moves continually from a hot to a cold spot—minimizing burning or pitting of contacts. The ingenious design of the arc chamber prevents carbonization and the accumulation of hot gases between wiring terminals—minimizing phase-to-phase failures. Sizes 0 and 1 use the same general mill type construction as the larger sizes.

- No filing, dressing or cleaning of contacts!
- No tools necessary to inspect contacts!
- Easy to change moving contacts!
- Stationary contacts changed quickly!
- Remove only two screws and one pin to change coils!
- Remove only four screws to take out stationary magnet frame!
- Power circuit contacts available with springs in complete packaged service kits for ease in stocking!



Phantom view showing Arc-shield

You'd better try **CLARK** TYPE **"CY"**

THE CLARK CONTROLLER CO.

ENGINEERED ELECTRICAL CONTROL • 1146 EAST 152ND STREET, CLEVELAND 10, OHIO

M. O. MONSLER
Sales Manager, Welding Equipment
Harnischfeger Corp., Milwaukee

HERMAN G. MUENCHINGER
Director of Research, American Screw Co.,
Willimantic, Conn.

L. G. KLINKER
Chief Engineer, Chemicals Pigments Paints
Glidden Co., Hammond, Ind.

J. H. BERRYMAN
Manager, Aircomatic Department
Air Reduction Sales Co., New York

made with the commercially available silver brazing alloys providing the surface to be brazed is properly cleaned by first sandblasting to remove the surface scale, and then pickled with a 10 per cent hydrofluoric acid solution. Once the section to be brazed is properly cleaned as above, it should be thoroughly fluxed with the prelaced silver solder ring in place. Fluxes containing a silver chloride metal depositing reagent give the best brazes. In brazing titanium and all other metal parts, slip fits of under 0.005 inch should be maintained to give maximum strength of joints. Induction heating has also proved highly successful in heating titanium for forming and forging where scale formation is minimized and die life extended.

Mr. Monsler

Electrodes useful for cutting and welding, depending upon angle at which they are applied, have been on the market for several years. This DH-4 type electrode is a very-deep-penetrating type for welding heavy butt joints without V or U curve preparation. DH-5 and DH-6 electrodes which are of the contact type have now been developed. These are a very fast-deposition-rate types of electrodes with very good tensile strength and better than average ductility. These rods may also be used for multiple pass work, and give a good dense porous-free metal deposit.

Machine development during the past two years has made it possible for us to produce and distribute both ac and dc transformer type welders with a minimum range of 3 amps. Electronic control has made this low amperage range readily usable when welding very light gages of stainless and aluminum metal. This development coupled with the rheostat type electronic amperage control of the welder, has greatly aided the aircraft industry, especially in the jet program.

Further development of special control cabinets embodying high frequency and gas and water controls has helped to make possible the welding of material heretofore classed as impossible.

Mr. Klinker

Adaptation of the retort batch method to copper brazing of stainless steel and the development of specialized furnace equipment for continuous stainless copper brazing are two results of the expanding use of brazed stainless assemblies in industrial and defense production.

Heating and cooling under atmosphere as is required for copper brazing of ordinary carbon steel, sintering of powder metal parts, nitriding, etc., is possible with the retort. The procedure is an excellent one to familiarize a newcomer on such processes before he must make decisions on larger continuous controlled atmosphere equipment.

The critical nature of atmospheres in stainless copper brazing is pointed up by the necessity of metal muffles in specially designed furnaces in order to prevent diffusion of moisture through brickwork to the work. In addition, atmosphere locks are very useful in charge and discharge zones to prevent contamination of the atmosphere actually in contact with the work during brazing.

Mr. Muenchinger

The metal fastener industry continues to raise its sights beyond the mere mass production of thousands of standard items all used in holding together durable and consumer goods.

Electronic, aircraft and other industries are daily challenging the manufacturers of fasteners to design and form screws, nuts, bolts, rivets, studs which will meet performance needs of a particular application. This may involve the development of products from new metals such as titanium or the capacity to mass produce items from special analyses of stainless steel wire.

The strength-weight ratio problem is involved in many cases where the fastener is engineered to a specific requirement. Further advancement in the design or structure of dies, punches and other metal forming tools has made possible greater precision in cold forming.

Precision has made necessary introduction of new inspection standards, special gages and other measuring instruments or devices, and the application of statistical quality control. New standards now include not only product specifications but also performance requirements and suggested inspection methods and gages.

Mr. Berryman

Following the success of the gas shielded metal-arc process in the "hard-to-weld" field, industrial demands have led to the investigation of its use in steel fabrication. Using wires and techniques which were developed from basic studies, the process has been applied successfully in steel production work. Results show that automatic gas-shielded welding offers opportunities for lowering costs in this field.

This welding process is penalized economically by the cost of the necessary shielding gases and by the higher cost of the smaller-diameter wires it employs. However, slag cleaning costs which are frequently higher than actual welding costs are eliminated by the new process which also can provide extremely high weld-

WILLIAM F. AMON JR.
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Minnesota Mining & Mfg. Co., Detroit

W. B. SHARAV
Metallurgist, Linde Air Products Co.
Union Carbide & Carbon Corp., New York

W. V. DAUGHERTY
President, Utica Drop Forge & Tool Co.
Utica, N. Y.

LAURENCE H. FLORA
Director of Sales
Tinnerman Products Inc., Cleveland

ing speeds and higher duty cycles. The new method is well adapted to automatic application. It is also valuable in cases where quality is a prime consideration. Its use in these fields is expanding rapidly.

Mr. Amon

Adhesive bonding is attractive to the metal fabricating industry for several reasons. While adhesives will probably never approach mechanical fastenings on a strength-per-unit-area basis, they can equal or surpass them on an over-all strength basis because they provide a continuous bond along the entire joint. Because the metal is not pierced or otherwise weakened, there are no points of potential rupture under stress. Thinner gage metals may often be employed in adhesive-bonded structures for this reason and also because there is no need to provide depth for countersinking.

High strength adhesives—that is, having shear strengths of 2000-4000 psi—are available from several manufacturers in liquid or solid form. Liquid types cure by addition of a catalyst at time of use, by heating or by a combination of both catalyst and heat. Solid types are marketed in sheet or tape form and cure by heating. We are going to see and hear more of these new construction materials in the immediate future.

Mr. Sharav

The high deposition rates and low cost characteristics of the submerged or hidden arc welding process are well established. This process, introduced initially for heavy steel welding, is being used today at an ever increasing pace for light gage welding. High welding speeds which today approach 200 inches per minute on a regular production basis have spurred the application of the process in this direction.

Rising labor and material costs have created demands for speeds ranging in excess of 300 ipm. This objective has not been reached, but in the last year with improved power sources and companion welding heads, single electrode welding speeds have been pushed to 150 ipm from a previous top value of 100 ipm.

Development of the parallel electrode welding technique has increased the top limit to 200 ipm within the year. Improved welding compositions, heads, controls, machine carriages and the development of the multiple power source, multiple electrode welding technique are expected to lead the way to this objective.

Mr. Daugherty

The rapidly developing process and tools for joining metals cold by pressure and controlled grain flow is of growing interest and is suitable for the more ductile metals. Present work is on aluminum, copper, lead and solder with others to follow. These welds are between like metals and between different metals such as joining copper to aluminum.

Briefly, the technique is to join clean surfaces to each other by pressure applied so as to produce a flow of non-contaminated metal of each part. Most important is the design of dies to produce a homogeneous movement under pressure. Welds so made have a structure similar to the original pieces welded and with a strength of 95 to 100 per cent of the metal parts joined. The weld also retains the physical characteristics of the metal parts making the assembly suitable for working or drawing.

To date, the development has perfected process and tools for lapwelding aluminum sheet and foil and such parts as wire and strip welded to sheet. Tools are in production for the buttwelding of aluminum and copper wire, rod and bars.

Mr. Flora

All markets, particularly consumer durable goods, are expected to become increasingly competitive in 1954 and the ability of engineered fasteners to greatly reduce total manufacturing costs and provide more attractive products will be brought more sharply into focus.

In many cases, assembly and materials handling time can be reduced 50 per cent or more through the use of engineered fasteners, and the appearance of any product can be enhanced greatly by the elimination of any visible evidence of attachment methods. Unit cost of the

FOR SIMPLIFIED TOOLING AND LESS SCRAP

WATERBURY FARREL MULTIPLE STATION FORMING MACHINES

Check into

To minimize costs on your shallow or long forming operations, look into Waterbury Farrel Multiple Station equipment.

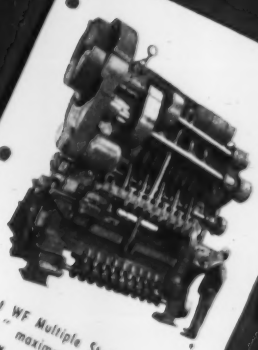
It offers several advantages over the progressive die method.

For example, these Waterbury Farrel machines can—

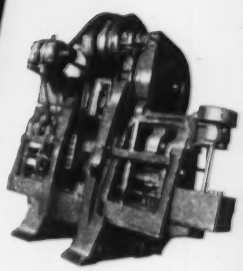
- CUT MATERIAL COSTS—By reducing scrap through more complete utilization of strip widths.
- REDUCE TOOL COSTS.
- PERMIT INDIVIDUAL ADJUSTMENTS FOR EACH TOOL.
- MAKE TOOL CHANGES QUICKER AND EASIER.

The machines shown here are just a few examples of Waterbury Farrel's line of multiple station forming equipment. All are ruggedly engineered for long-lived efficiency and low maintenance operation.

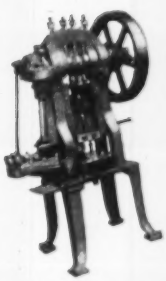
Write or phone for further information



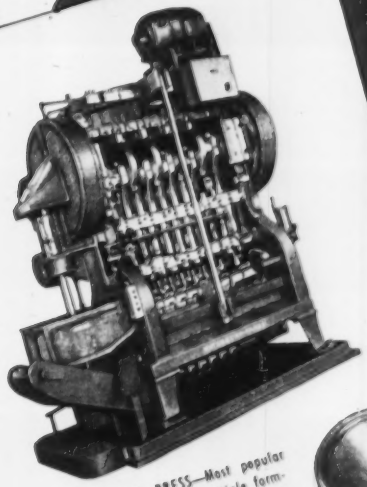
Largest WF Multiple Station Machine for 6¼" maximum blank—3¼" deep draw.



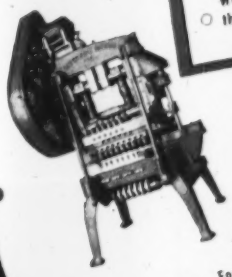
WF ESCUTCHEON PLATE MACHINE — for heavy forming.



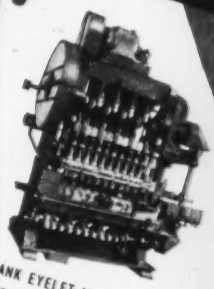
WF DOUBLE GATED PRESS—for two or three operations.



WF MULTIPLUNGER PRESS—Most popular machine for hardware and multiple forming work where medium swaging and drawing is required. Has new, electrically operated air clutch—individual plunger operation and adjustments — four motion transfer bars with safety fingers. At the delivery end, conveyor lifts finished work to barrel height.



WF TRANSFER PRESS — For shallow work and higher speed operation.



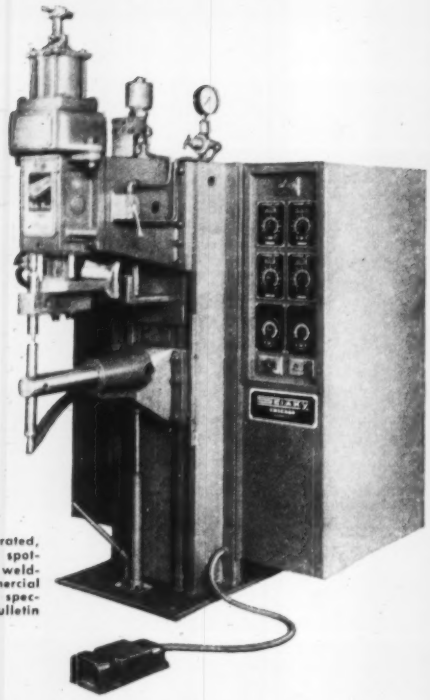
WF CRANK EYELET MACHINE — These machines are designed for lighter work than multiple plunger presses, but will handle heavier forming than WF's cam Eyelet Machines.

WATERBURY FARREL FOUNDRY & MACHINE CO. — WATERBURY, CONN.

WATERBURY FARREL FOUNDED 1851

POWER PRESSES — Crank, Cam and Toggle; also Rack and Pinion Presses • Eyelet Machines • Multiple Plunger Presses • Horizontal and Hydraulic Presses, etc. **MILL MACHINERY** — Rolling Mills: Strip, Rod, Wire Flattening, (For Ferrous and Non Ferrous Metals) • Also Slitters • Straighteners • Cut-off Saws • Coilers • Winders, etc. **WIRE MILL EQUIPMENT** — Continuous Wire Drawing Machines (Upright Cone and Tandem) • Wire Flattening Mills • Chain Draw Benches • Pointers • Swagers • Bull Blocks • String-up Machines • Spoolers, etc. **COLD PROCESS BOLT & NUT MACHINERY** — Headers (all types) • Rivet Machinery • Trimmers • Thread Rolling Machines • Slotters • Nut Formers and Tappers, etc.

YOU CAN USE
STANDARD SPOT WELDERS
FOR SPECIAL APPLICATIONS



The SPT2, an air operated, press type, Three-Phase spot-welder, is designed for welding to highest commercial standards. For complete specifications, write for Bulletin No. 306-1.

Three Standard Sciaky Three-Phase Machines Simplify Complications of Welding Bumper Guards

Grand Rapids Metalcraft, a Division of F. L. Jacobs Co., consulted Sciaky about special machines for resistance welding two mounting brackets in automobile bumper guards. Definite requirements of strength, outside appearance, and production were complicated by limited power facilities.

After careful examination of the problems, Sciaky engineers adapted completely standard spot welders with simple tooling.

Sciaky patented Three-Phase Principle of operation with balanced line load, near unity power factor, and reduced KVA demand readily satisfied limited power facilities, where conventional single phase would not.

Not only did the strength of spotwelded assembly exceed requirements, but Sciaky Three-Phase operation eliminated need for special metal finishing.

Compared to previous method of arc welding, production soared . . . a fraction of the equipment and floor space was needed . . . three unskilled workers replaced many highly skilled men . . .

Write for the complete story of Grand Rapids Metalcraft's use of standard Sciaky welders for this job. Ask for "Resistance Welding at Work," Volume 3, No. 8.

Largest Manufacturers of Electric Resistance Welding Machines in the World

SCIAKY

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A. N. KUGLER
Chief Welding Engineer
Air Reduction Sales Co., New York

fastener itself is reduced by developing the device to its most economical size to perform the required function and provide for maximum speed of assembly.

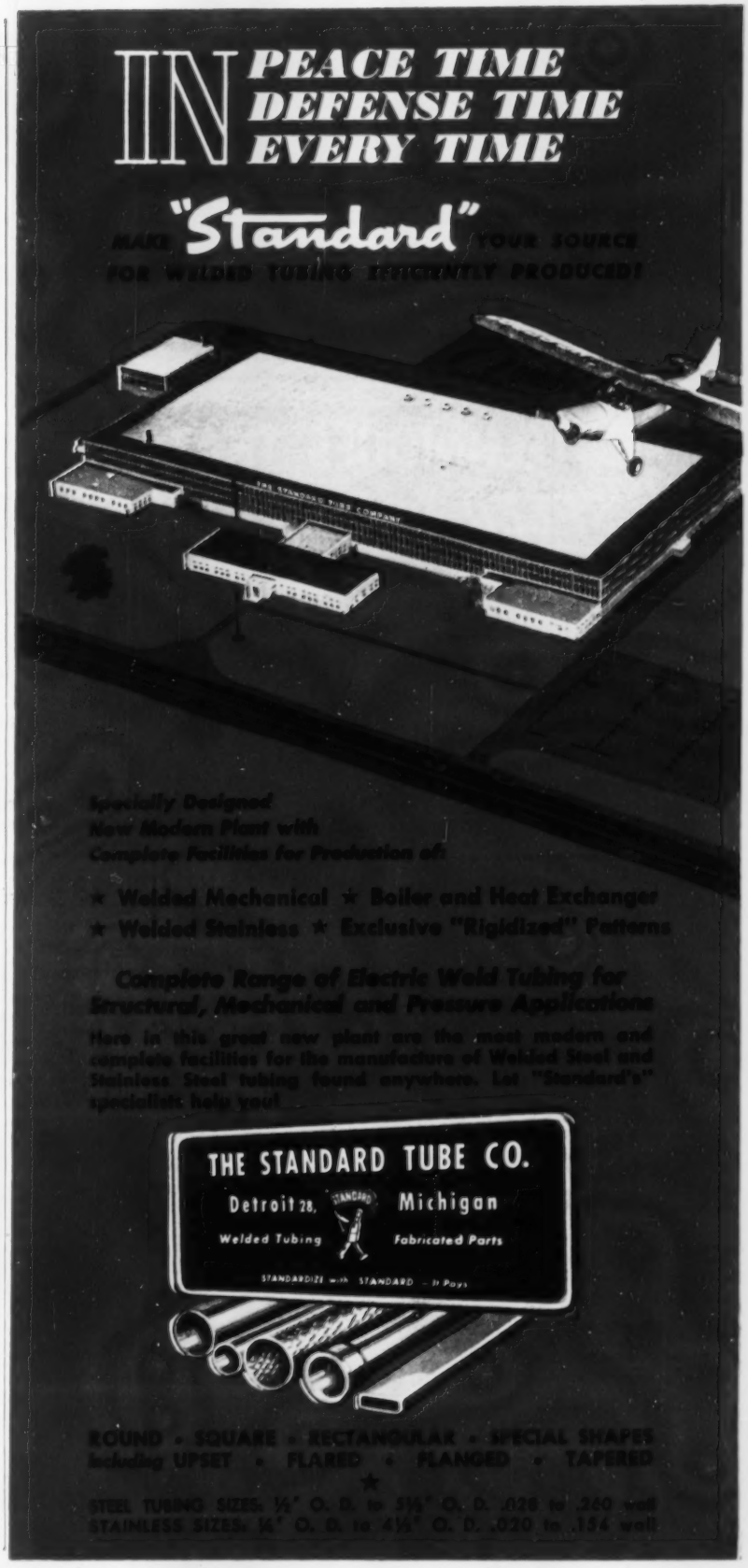
Further substantial cost savings can be achieved through the elimination of large capital expenditures for welding, riveting and staking equipment and accessories which engineered spring-tension fasteners render unnecessary. Prominent also in the 1954 production picture will be an increasing use of multi-purpose fasteners—job-engineered fastening devices incorporating as many as a dozen parts in one.

Mr. Kugler

In the field of arc welding one may anticipate even wider use of the low hydrogen electrodes. Notwithstanding some problems with moisture in the coating and the attendant package requirements these electrodes provide the best solution currently available to the welding of alloy steels. They also provide optimum mechanical properties particularly where pre-heat and post heat are not practicable.

Brazing, a process that goes back to antiquity, is finding ever widening fields of application. Brazing with silver base alloys has long been practiced with eminent success. More recently the brazing principle has been extended to such materials as aluminum and magnesium. Perhaps even more significant is the use of brazing filler metals at temperatures around 2000° F for jet engines and similar high temperature components and parts.

In recogntion of this important field of brazing work the AWS has in preparation a very exhaustive manual covering all the brazing proc-



I. A. OEHLER
Director of Metallurgy & Research
American Welding & Mfg. Co., Warren, O.

G. O. HOGLUND
Section Head, Process Development
Aluminum Co. of America, Pittsburgh

esses for virtually all of the metals. This manual is well along in preparation and its publication is expected in the very near future.

Mr. Oehler

The problem of increased application of automatic welding is that of bringing the head and work into proper relation for welding. On repetitive jobs, savings to be realized have justified elaborate work positioning fixtures, but on runs of a few pieces or on very large parts, such fixtures have not generally been justified.

Some recently introduced head positioning fixtures have provided flexibility through rapid traverse and precisely controlled movement in two or more planes. These will permit simplification of work positioning fixtures, hence further uses of automatic welding now await the application of proved processes to a specific design through the ingenuity of engineers in tooling for the job.

For resistance welding, quick die holding devices have been introduced to make possible rapid changeover of equipment for a variety of welding jobs. In this field, too, the way toward increased applications is provided through fixture and feed mechanism design.

Mr. Hoglund

Welding, probably the most useful method of assembly for aluminum alloys, has been handicapped by joints of low strength in some applications. During the past decade, however, better welding methods and stronger, more weldable aluminum alloys have been developed.

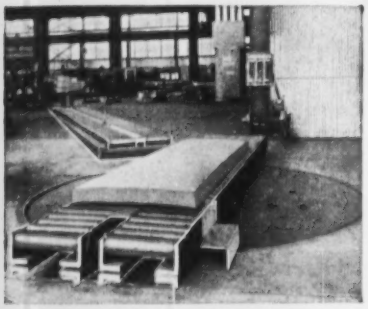
Most important was the introduction of A54S sheet and plate for structures and pressure vessels. This alloy provides weld strength that is double that of 3S alloy, which has previously been the most weldable.

Welds in A54S also have excellent ductility. The application of A54S to large diesel engine bases in 1953 marked the first use of heavy welded construction for this type of service. This alloy was also used for tank cars, gasoline tank trailers and for many pressure and chemical tanks.

Another project that has been in preparation for many years is now about to reach successful completion. This is the Non-Ferrous Unfired Pressure Vessel Code developed by the American Society of Mechanical Engineers. The Welding Section of the A.S.M.E. Boiler code has also been completely rewritten to include non-ferrous alloys.

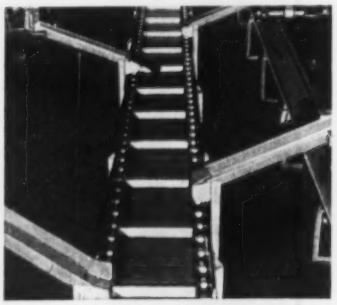
1954 TECHNIQUES THAT SPEED PRODUCTION

COILS OF STEEL—weighing as much as 30,000 pounds—are handled quickly in a large eastern steel mill on this A-F *Engineered* Completely Coordinated Conveying System. An A-F Tilter discharges coils *automatically* from conveyor. Many other features speed up work of stacking and distributing sheets.



THIS A-F ROLLER CONVEYOR mounted on a powered turn-table distributes stacked sheet steel to the many work bays in this modern steel plant—easier and faster.

For information regarding latest, most efficient methods of handling metal products, coils of steel, stacked sheet steel and metal scrap salvage—write today.



FOR EFFICIENT SCRAP HANDLING

An A-F Pan Type Overlapping Beaded Apron Conveyor takes scrap (via slides) directly from stamping presses and conveys it to a long A-F Reversing Conveyor of similar construction which discharges scrap into either railroad cars at one end or trucks at the other.

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CONVEYING EQUIPMENT
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WASHING MACHINES FOR INDUSTRY

SHARONSTEEL

reduces operating costs

with 6 thrifty BALDWINS

The use of six continuously operating Baldwin-Westinghouse diesel switching locomotives by the Sharon Steel Corporation at their Roemer Works reduced operating costs. Here is Sharon Steel's report:

- "We have found that operating costs are lower with the Baldwin-Westinghouse diesels than they were with steam locomotives.

"There is a reduction in operating delay at each turn change time, because refueling and resanding is done only once every three days. Formerly, we took on water, coal, sand and cleaned the fires at each turn change.

"The installation of diesel locomotives has been a large step forward in our air purification program. The elimination of smoke and dirt produced by the steam locomotives entering buildings has greatly improved working conditions. Another improved feature over steam locomotives is the ability of the Baldwin diesel to rapidly generate more air pressure for our air dumped cars."

If *you* are interested in cutting *your* operating costs, write now for Bulletin DMH-300, to Dept. 1646, Baldwin-Lima-Hamilton Corporation, Philadelphia 42, Pa.

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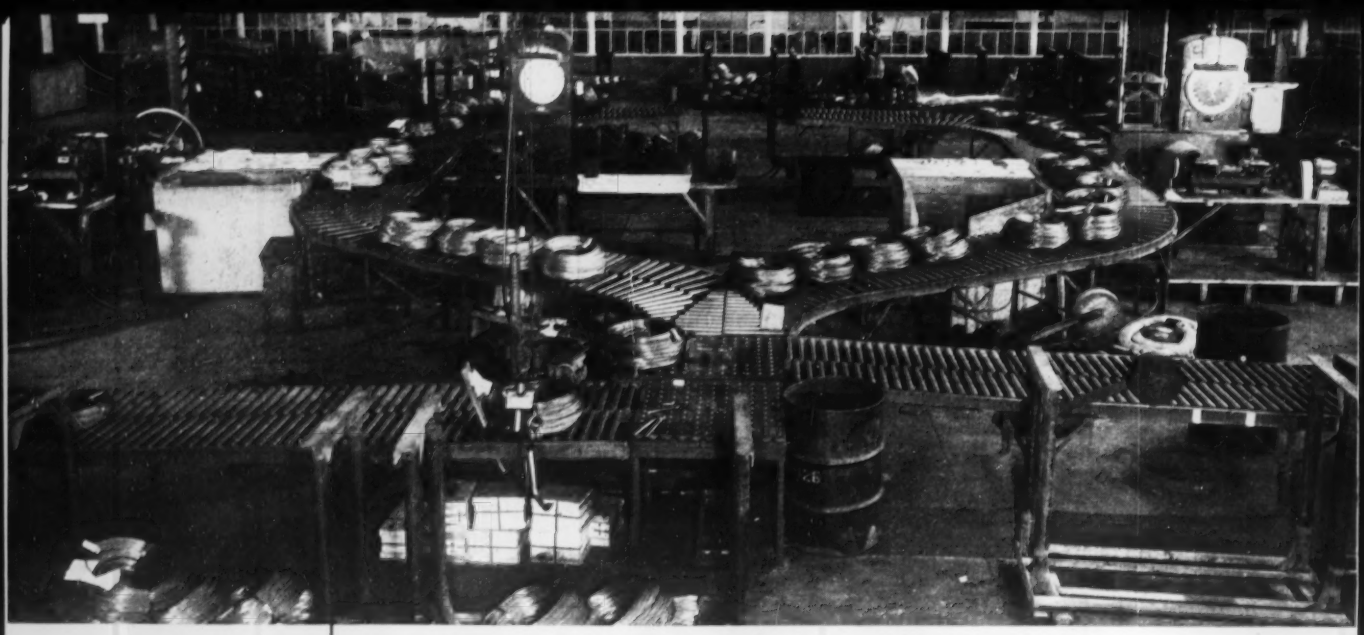
INDUSTRIAL LOCOMOTIVES

..they're thrifty!



TECHNICAL PROGRESS

Handling and Packaging

BIGGEST bill industry pays is to labor. Minimizing this outlay is essential to competitive 1954. Best method: Mechanized handling and packaging to eliminate manual effort.

Powered conveyors to integrate process equipment will command most of the headlines. But the principle extends indefinitely. For instance, in warehousing, automatic equipment can even load and unload conveyors and route materials.

Manufacturers depending on lift trucks will find improved power transmission, whether they use gas or electric units. Torque converters and gas-electric drives are minimizing major clutch wear problems. Aisle widths continue to shrink as manufacturers fight to store more in less space. One approach: Side-loaders deserve and will receive increasing attention.

Overhead equipment—stationary and traveling—is getting improved controls that spell faster work and greater safety. Specialized illustrations are built-in automatic weighing and stabilized cranes where fast handling without sway is essential.

Refinements in packaging stem from two major approaches: First, further centralizing packaging stations to co-ordinate with production lines will reduce space required; lighter manual equipment and improved powered tools will do a better job with fewer men. Second, tremendous increase in acceptance of vapor corrosion inhibitors, both by military and civilian users, will get this ferrous preservation technique into most metalworking operations. VCI's selling points: Faster, safer packaging and storage; virtual absence of depreservation problems.

Mr. Elledge

Industrial and population growth, exceeding the increase in the nation's labor force, will move industry to more extensive use of mechanized materials handling methods. Maintaining a position in industry will require the industrialist to mechanize and improve plant operations faster than ever before. Objective operations' analysis will disclose improved material handling to be the greatest dollar saving possibility for industry today.

Progressive mechanization, the art of more effectively mechanizing every handling operation, will be the order-of-the-day in plants keeping pace with increasing demand for more goods. Spot applications of material handling machines will give way to systems using, as needed, many types of standard and special handling devices. These systems will be well conceived and designed to fit specialized needs of industry. Their result will be aid to the worker and better plant morale. They will provide increased production and better utilization of plant facilities, positive material flow, reduction of inventory and less damage to goods in process.

The industrialist, in every field of endeavor, will be well advised to heed the pressure for greater production and prepare facilities accordingly.

Mr. Hanson

Reports from our 69 member companies as well as from the material handling industry as a whole indicate an increase in shipments in 1953 of equipment of 20 per cent over 1952. In spite of reductions in government spending, we expect material handling equipment sales in 1954 to come close to 2 billion dollars. One reason for this is that we are increasing sales to present users of modern handling equipment. A second reason: New markets are opening up. Reason number three is the increased attention being given to material handling by top management. More and more we find the material handling function represented on a vice-presidential level.

The past year was characterized by three mergers of companies within the industry to broaden product lines and gain new dealer outlets. Most significant was purchase of a forklift truck company by a manufacturer of conveyors.

Manpower shortages continue to plague both makers and users of handling equipment. Within the next few years it is estimated that industry as a whole must find 500,000 men to operate new material handling equipment. An even greater need exists on the part of users for engineers to train, supervise, survey, integrate men, machines and methods.

Mr. Caldwell

Since World War II development of the lift truck has been in two main directions: Education of industry to its value and mechanical improvement of the machine. Only 7 or 8 years ago the materials handling sales-engineer was more missionary than salesman. Today almost every forward-looking businessman is thoroughly familiar with the advantages of modern handling equipment. Colleges have set up special departments to teach it.

Many firms today are built around the use of these machines, their operations geared to lift trucks. Each day finds many more new uses for this versatile machine. In contrast to the crude machines of World War II, today's lift trucks are engineered to provide the ultimate in compactness and maneuverability.

As for tomorrow's truck, I doubt that there will be any radical changes in basic design—engineers have gone about as far as they can go along these lines. There will be, I am sure, many more advances in operating convenience, efficiency and economy.

Mr. Larson

Considerable product cost reduction can be achieved by modern industry through better materials management. Educational programs that promote interchange of ideas among manufacturers, equipment suppliers, distributors and the transportation industry are a most effective means of increasing efficiency and safety in handling, packaging, warehousing, scheduling and shipping of materials.

Currently a trio of interests—education, industry and professional organizations—are working together to develop a sound program of materials management and materials handling engineering. The College-Industry Committee on Materials Handling Education, made up of nine university professors and nine industrial executives, is active in this endeavor.

Associations contributing to build a materials handling education program include: Material Handling Institute, American Material Handling Society, Society of Industrial Packaging and Materials Handling Engi-

C. B. ELLEDGE
Manager, Materials Handling Industries Sales, General Electric Co., Schenectady

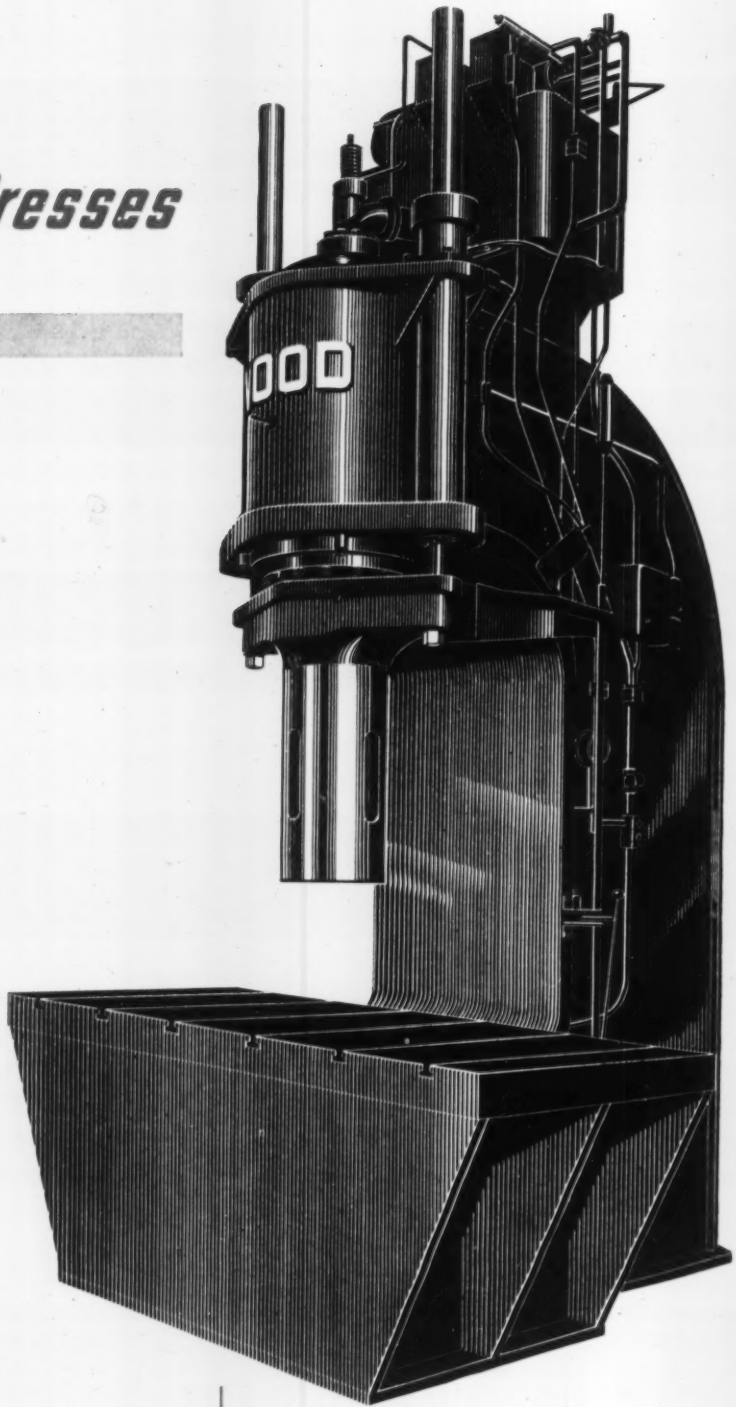
R. KENNEDY HANSON
Managing Director, Material Handling Institute, Pittsburgh

EUGENE CALDWELL
Vice President & General Manager Hyster Co., Portland, Oreg.

SPENCER A. LARSON
Director, Materials Management Center Wayne University, Detroit

R.D. Wood Hydraulic Presses

"... that industrial equipment
which has maintained
high excellence in manufacture
will continue to be sold,
and will contribute its worth
to uplifting the general
quality of everything produced
in industrial America ..."



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Sales Manager, Tramrail Div., Cleveland
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G. B. DAVIS
Vice President, Baker-Raulang Co.
Cleveland

neers, and American Society of Mechanical Engineers. Colleges and universities active in the effort include: Wayne, Illinois Tech, Michigan State, Purdue, Cornell, Columbia, N. Y. U., M. I. T. and U. S. C.

As an example, Wayne University's Materials Management Center, now in its second year of operation, has an annual enrollment of about 1000 in its 35 courses. Objectives of the program: 1. Develop and teach basic principles, techniques, methods of analysis and equipment needed in solving materials management problems, and 2. Promote understanding of organization and management principles essential to obtaining teamwork in materials supply functions.

Mr. Bucuss

Many segments of industry are effecting substantial savings in material handling and packaging costs by integrating movement of their products through centralized packaging stations located on conveyors co-ordinated with production lines. These economies result from employing the most suitable equipment and materials and from breaking overall handling and packaging operations into elements, with each individual phase performed by a specialist.

Steel companies have done a tremendous job in expanding output by better utilizing plant productive facilities. This increased output, as it concerns sheet steel has impetus given to consideraton of packaging flat sheet steel in centralized locations on conveyor lines. Perhaps the greatest deterrent to adoption of this method has been the problem of getting skid runners, steel strapping and paper under the steel on the conveyor line without excessive handling by elevating mechanism. Developments in conveyor design, if incorporated, afford the solution.

As a part of this improved packaging procedure for sheet, hydraulic powered equipment for tensioning and sealing steel strapping is available. This equipment, and electrically powered dispensers used with it, are designed to ease strapping application and afford uniform controlled tension, while effecting considerable saving in strapping consumption.

Mr. Anjeskey

Demands of the aircraft industry for handling equipment required in annealing aluminum airplane parts in salt furnaces involves moving parts from the furnace to a cold water quench in 12 seconds or less. To meet such a handling cycle, we developed a pneumatically-operated stabilized hoisting unit which is self-contained. Compressor and air storage tanks were built into hoisting unit carriers so pneumatic or air cylinder could receive full pressure from air storage tanks without any losses. Operating pressure on the cylinder is 80 pounds. Lift is 7 feet, with hoisting speed of 200 fpm; horizontal travel speed of the carrier is 200 fpm.

Stabilized hoisting unit originally designed and patented to operate with an electric hoist is capable of lifting a load, transporting it without any swing in the load, providing stability laterally, longitudinally and rotationally. It also made possible applications for handling racks through anodizing operations. Another job is handling industrial x-ray units which can be moved over a floor area where parts to be x-rayed are deposited. Fact that an x-ray picture can be taken without any distortion is evidence of the stability of this unit.

Mr. Walter

Automatic strapping machines have been and are being developed to double or triple strap a package, box or crate simultaneously. Manually-operated machines are being made of lighter weight metals to reduce fatigue and render a more efficient strapping application.

It can be stated that the strapping industry broadens its own markets and thereby permits an increase in participation by all in the industry. This aspect could not be on a continuing basis unless technical service is rendered on the same basis. Development of new strapping applications requires an effective technical service. In an industry where products sold are of substantially the same type and quality, service is of paramount importance. As a future byword, service will be emphasized in the strapping industry and from it will follow better packaging techniques.

Mr. Davis

Truck handling progress in 1954 will occur in both application and product. In the realm of application, considerable emphasis in metalworking plants seems to be on outside storage areas for molds, dies and raw materials. Long neglected by most plants, new equipment is being developed to permit application of unit load handling and stacking here as well as in the plant. Straddle trucks find increasing application as well as newer side-loading trucks which stack as well as carry. Strong, low-cost racks made of scrap structural steel will serve to carry and segregate these loads.

Changes in products will probably be concentrated on operating economy. New automatic transmissions in fork truck are a barometer. These are all designed to eliminate clutch and transmission trouble—perennial sore spots for truck owners.

New equipment is expected in coil steel handling. With coils now ap-

HOWARD M. PALMER
General Sales Manager, Lewis-Shepard Products Co., Watertown, Mass.

L. T. SYLVESTER
President, Mathews Conveyer Co., Ellwood City, Pa.

R. C. SOLLENBERGER
Executive Vice President, Conveyor Equipment Mfgrs. Association, Washington

ELMER F. TWYMAN
Vice President, Philadelphia Division Yale & Towne Mfg. Co., Philadelphia

proaching 80,000 pounds in some cold reduction mills, conventional ram truck with its cantilever construction is death to the strongest floors. Such trucks weigh more empty than the load. Careful examination of the older platform methods or some variation like the sideloader is being undertaken. Both these units are lighter than the cantilever (fork or ram) types.

Mr. Palmer

Industrial power truck users can expect continued development of more diversified designs. Within the last few months, several completely new truck designs have been introduced. Unquestionably there will be an even greater demand for maximum lifts from trucks with low collapsed heights. Much higher lift heights than now available may very well become widely used. New fork attachments will undoubtedly continue to solve more and more handling problems.

For certain types of work, sideloading trucks will be developed to greater degree. Remote control operation of fork lifts will provide new possibilities in handling systems. The years ahead will bring continued improvements in hydraulics. There has been in recent years a very great demand for compact designs of trucks. Some manufacturers have already reduced the aisle width requirements of counter balanced trucks by 25 to 30 per cent. Although at present they seem a long way off, consideration must be given to the possibilities of entirely new motive power. Commercial atomic power, as an example, has suddenly become within the realm of possibility.

Individually or in combination these developments mean better operating characteristics, lower maintenance costs and increased efficiency for the present fork truck user plus modern handling methods for a host of businesses which never before could consider fork truck installations.

Mr. Sylvester

As far as expenditures for materials handling equipment are concerned, we recognize that some industries have pretty well exhausted their backlog and that many others are rapidly catching up to consumer demand. I don't feel that this condition indicates any serious slump in business, but rather a return to a more normal volume. We should prepare for increased competition with a more intensive approach to our sales problems.

It is probably safe to say that purchases of so-called heavy conveyors and other capital equipment by the metalworking plants will be less than they were last year. Nevertheless, we are optimistic and expect these industries to be reasonably active. For them as with all other industries, 1954 will undoubtedly be a year of intense competition and one which will see some very close attention paid to improvement in production machines and methods. Every opportunity possible to reduce costs will be carefully considered.

Mr. Sollenberger

Integration of conveyors and process equipment is the essence of automation and applications in industries characterized by repetitive processes now number in the hundreds. The principle will also be used in warehousing where automatic equipment will load conveyors, route materials to keyed locations and unload without manual labor.

There are already several endless belt conveyors more than a mile long moving such bulk materials as mineral ores, coal, sand and gravel. Most ambitious project on the horizon is the Riverlake project—a 103-mile conveyor across the state of Ohio that will carry iron ore southward from Lake Erie boats to the Ohio River and coal northward from Ohio River barges to the Cleveland industrial area.

Other advancements in the industry indicate conveyor users prefer complete, integrated jobs and manufacturers are tending to incorporate motors, controls and similar auxiliary equipment when the system is built. Although conveyor manufacturing has been a large industry for two generations, as many conveyors have been installed in the past 10 years as in all previous history. And demand for cost saving as profit margins become narrower means demand for more conveyors.

Mr. Twyman

Increased competition between manufacturers is a favorable growth factor for the entire materials handling industry. In 1954, competition for markets will be more intense than at any other time in recent years. In order to survive in this hard sell economy, manufacturers must reduce production expenses—and handling costs consume roughly one-third of each production dollar. Annual growth rate of the materials handling industry over the last ten years has been far in excess of the rate for the U. S. industrial production index. This accelerated rate will continue as not only manufacturers, but the service industries search for new ways to safeguard profit margins by increasing productivity and lowering handling and distribution costs.

The materials handling market of today must be considered fluid instead of static since materials han-

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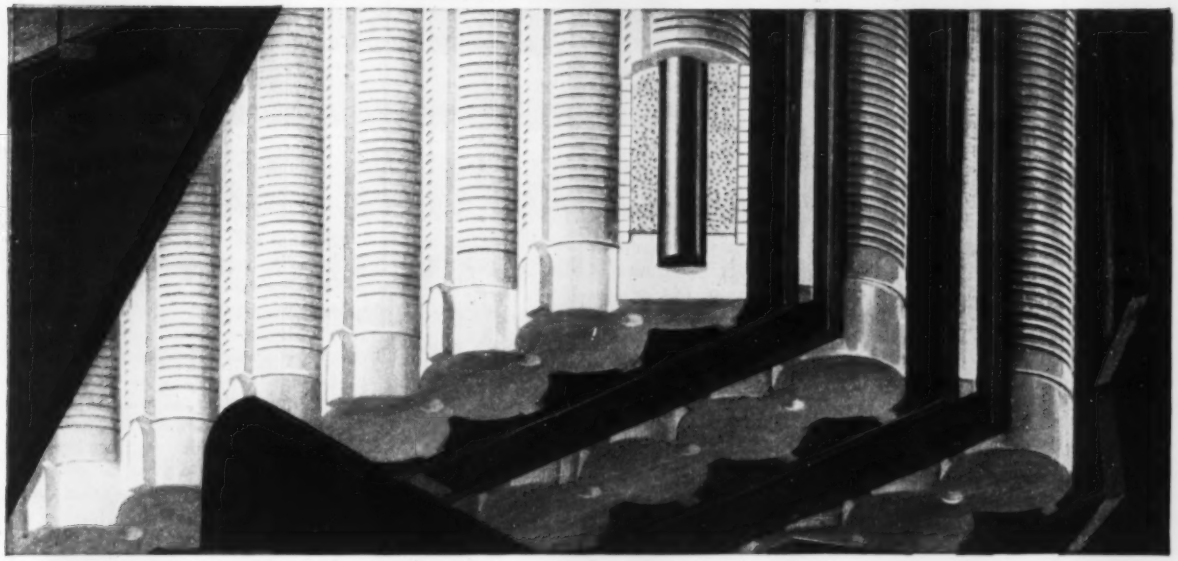

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THOMAS S. POOL
Assistant Sales Manager, Vapor Wrapper
Div., Nox-Rust Chemical Corp., Chicago

dling manufacturers are constantly opening additional markets with new engineering refinements. Handling equipment manufacturers are working closely with a number of industries to solve specific handling problems.

As a rule the larger companies have been the first to avail themselves of savings that accrue through efficient use of materials handling equipment. But now many smaller service and manufacturing industries are showing increased interest in mechanized handling. This interest is heightened by time sales and leasing plans.

Mr. Shea

Some significant developments we see in materials handling are:

(1) Increased awareness by all management functions of better handling methods and equipment as a profit producer.

(2) Recognition of material handling as a service facility.

(3) Placement of the manager of the material handling system along with other management people.

(4) Lower breakeven points through volume increases resulting from more output per unit of floor space, machinery and direct labor through better material handling. New material handling methods and equipment average less increase in fixed costs than other means. They also effect a greater reduction in the variable cost factor represented by a product's labor content.

(5) A greater awareness of the value of supplying materials to work stations at convenient work level in a continuing uninterrupted supply.

Mr. Borchers

Perhaps the most important current development in truck handling is a change in many plants from hand to powered lift trucks. This is largely motivated by increased cost of labor. For instance, a large steel foundry replaced a much greater number of hand lift trucks with five electric lifts for movement of castings. Heavy loads are moved with no physical effort on part of the operator and time required for handling castings is cut in half.

Attachments for walkie electric trucks include crane units, die pullers and pushers. Latter makes a safe one-man job of removing heavy dies from presses and moving them to and from racks.

Another truck handling advance is radio remote control for electric industrial trucks and tractors. The operator, by means of a control box on his belt, motivates the truck and controls its movements while he is some distance away. This electronic control is responsible for some substantial manhour savings, as well as retarding worker fatigue.

Another way in which many plants are compensating for increased cost of manhours is by moving materials and products in larger, heavier loads. Lift trucks of higher capacity are available, and demand for them is increasing.

Mr. Whitehurst

Heavier demands on all types of powered haulage equipment have developed the need for batteries with greater capacity in the same space, and with lower costs of owning and operating the equipment. Battery manufacturers must look for new materials and continued engineering development to meet these requirements. In this connection, we developed a battery designed to give 20 per cent more capacity in the same floor space without any sacrifice of life.

The battery is of time-tested power tube positive plate construction. New materials have made structural changes possible which permit use of larger positive plates resulting in increased capacity. For use with this new positive plate, and to balance performance, there is an extra heavy negative plate. A practically indestructible mechanical microporous separator is used between positive and negative plates.

Mr. Pool

Rust is not a particularly great problem in well run plants today, but rust prevention costs most assuredly are. Among these costs are dipping, spraying or brushing time; draining and drying costs; handling time to and from rust prevention departments; added costs of grease-resistant papers, boxes, and shippers; costs of unproductive floor space occupied by rust prevention departments; costs inherent in fire hazard; and the costs in time and good-will through the need of messy preservative removal, before the item can be used.

Through improved equipment and methods, as well as through the use of up-to-date rust preventive compounds, many of these costs will be substantially reduced. Most dramatic and appealing cost reductions will come, however, for firms eliminating

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In designing and building cranes since 1910 this company has adhered to a policy of thoroughly studying each problem presented from the standpoint of conditions faced and service to be rendered in order to recommend the proper type of crane and equipment.

Growth in future demands is also considered and it is significant that some of the first Euclid Cranes manufactured are still in service. Impressive, too, is an uncommon record of repeat orders.

Euclid has the experience to study needs and render sound counsel to crane user; also engineering personnel and factory facilities to translate the facts obtained into equipment of the highest order.

You are invited to avail yourself of this counsel and can do so without entailing any obligation.

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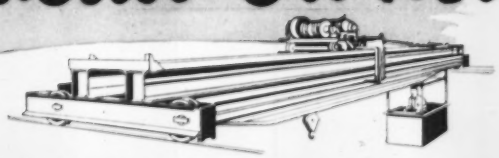

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Underslung, floor controlled crane designed to afford maximum use of a material warehouse.

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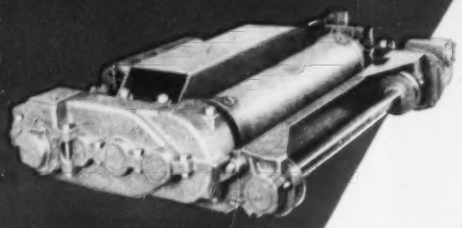

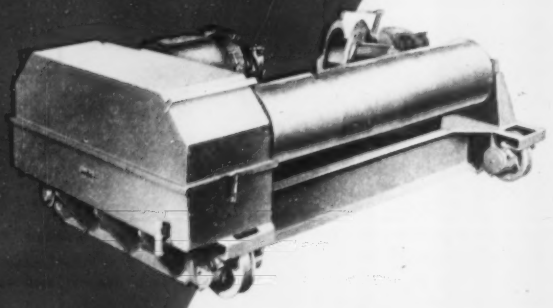

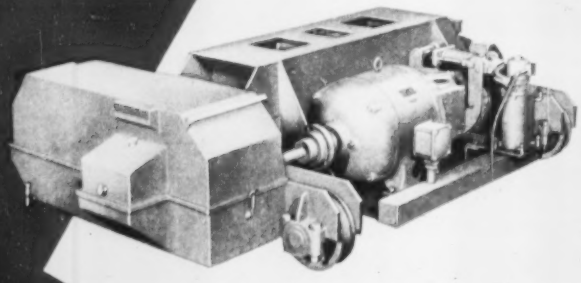

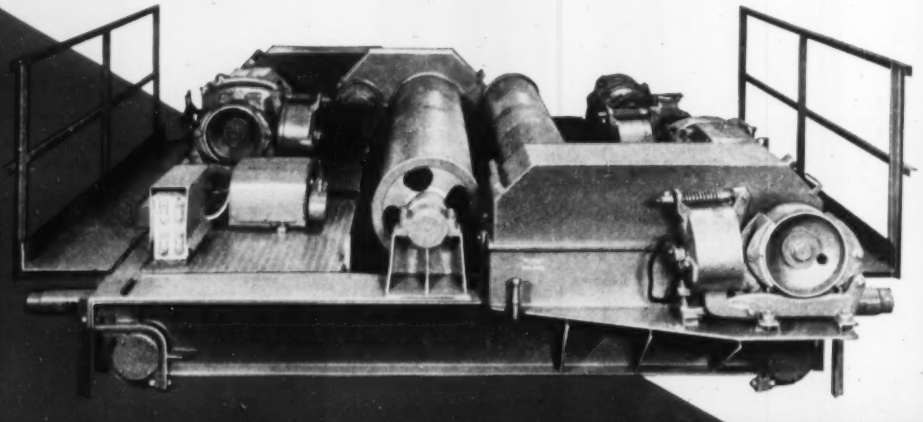

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Executive Vice President, Cambridge Wire Cloth Co., Cambridge, Md.

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most of these costs on many products by wrapping them for shipment or storage in invisible clouds of rust preventive vapors.

Vapors are released by volatile chemicals in the form of powder, crystals and liquids; or as an impregnation into papers, boxes, envelopes and case or tote box liners. Ferrous metals protected by vapor wrapping need no other rust prevention as long as provisions are made to confine the vapors around the metal.

Mr. Franz

While materials handling generally is considered a means of transporting products or moving parts from one station to another, we have applied it specifically to increase actual productivity of the individual machine tool. After development of tough alloy steels capable of great metal removal when used as cutting media in machining operations, industry demanded machine tools of greater productivity.

In making design changes, not too much consideration was given to adequate provision in the machine bases for continuous removal of corresponding increase in volume of chips and turnings produced. Therefore, in many instances productivity is materially reduced because of necessary periodic shutdowns for manual removal of scrap.

Where machine construction permits the use of continuous chip removal units, production is increased from 10 to 20 per cent. Considering the over-all investment in modern machine tools, this is an important factor being recognized by more builders. The thinking of today is to keep high production machine tools operating continuously and it is our prediction that the manufacturer who can offer his customers a machine fully equipped for continuous chip removal will be in the driver's seat.

Mr. Blum

Industry's chart of progress indicates that cranes today are safer, the operator's vision and comfort have been given the attention of the crane designer, the use of higher speeds has resulted in the handling of material faster and more economically. Use of alternating current in cranes has made tremendous strides in the last five years due to better control being available, allowing for higher speeds.

Further progress is indicated in the announcement of an electronic weighing device built into the crane hook block which allows weight determinations to be made without the use of the conventional platform scale. This provides tremendous flexibility not available when using the platform scale. This weighing device is available for loads up to 200,000 pounds. Complete weighing device is incorporated in the bottom block of the crane, requiring little additional clearances.

Recording instrument determines weights immediately when load is lifted, precluding necessity of additional manpower for recording loads.

Only usual hookup men are required to attach the load, an operation necessary in any normal transportation of material to be weighed.

Mr. Hooper

Field of woven wire conveyor belts reports 1953 the largest in its history and all indications point to a still larger year for 1954. Significantly, sales to the vast metalworking field have shown the largest percentage of increase. Copper and aluminum brazing, sintering, annealing, carburizing and tempering are being performed continuously on woven wire belts.

Typical of these installations is a large spring producing plant which, with a woven wire conveyor belt, has boosted output 350 per cent in 30 per cent less floor space. One-hundred-ten hand trucks are no longer needed. Fifteen truck operators are freed for more productive work. Springs are nitrided, normalized, cooled, waxed and dried continuously, eliminating need for hand trucks in transferring work from one step to the next.

One of the principal advantages of woven wire conveyor belts is that they can be used to combine movement with processing in cases involving even heat, cold or corrosive agents.

Mr. Kimball

There's a significant change taking place in the packaging program of metalworking plants. It's the trend to more simple ways of preventing rust with vapor—the volatile corrosion inhibitors. Indications we see for an acceleration of this trend to vapor rust preventives are these: By eliminating need for slushing metal parts in grease, users have found that preservation costs can be reduced substantially.

Because vapor-protected parts are shipped clean, customers are saved degreasing costs. This benefit becomes increasingly important because

M. W. HEINRITZ
Vice President, Gould-National Batteries Inc., Trenton, N. J.

J. P. LAWRENCE
President, American Monorail Co. Cleveland

SHELDON K. TOWSON
President, Elwell-Parker Electric Co. Cleveland

D. A. FRIEDMAN
Vice President, Solar Steel Corp. Union, N. J.

it is a distinct sales advantage. As slushing tanks and combustible compounds are replaced with vapor preservative, a recognized fire hazard is eliminated.

For some time the army has had in effect technical instructions on use of volatile inhibitors. However, recent adoption of this method for larger weapons—up to 280 millimeter cannons—indicates increasing use by the military. Government specification that covers its use is MIL-P-3420.

The Navy has written its own specification and now the Air Force has issued instructions for its application. It is expected that soon MIL-P-116-B will be amended to include this preservation method.

Mr. Heinritz

It is reasonable to assume that total sales for the battery industry will be a bit below 1953 figures because of some curtailment of purchases by the government and associated plant activities. Perhaps over-all industrial sales might be off from 20 to 25 per cent from the 1953 total. It is estimated that total sales for the battery industry should reach about $80 million in 1954.

We can report several important manufacturing techniques to improve battery performance and extend life. One contribution that anticipated the need for high performance is progressive solidification casting of battery grids. This insures maximum metallic density of every member of the grid structure. The entire industry has progressed substantially by designing batteries for specific applications to produce maximum results in manufacturing, transportation, utilities, and other service organizations.

Another expanding market for batteries is the increased installation of power distribution facilities within manufacturing plants. High voltage electricity is purchased from the power producing utilities and redistributed within the plant for rigid control of voltage for the many types of machines and equipment operated. Batteries are needed to operate the switch gear installations in this expanding market. Latter application offers a promising area for technical development among battery manufacturers.

Mr. Lawrence

With the leveling demand for equipment going into defense production we look for increased application of power operation not only for movement of heavy loads, but also for horizontal propulsion of small capacity hoists. Standard units are now available for loads of 250 to 10,000 pounds. Considerable extension is also expected in the development of automatic dispatch carriers.

Power operated underslung cranes, particularly for 5 to 10-ton loads, have been redesigned for constant-duty service with major improvements in trolleys to eliminate friction and in application of new drive units.

Mr. Towson

There has been much said on the subject of leasing vs. purchase of material handling equipment. We are all familiar with current emphasis on renting or leasing. In favor of such thinking is the fact that the user who never has any equity or an expectation of equity in his equipment may take a tax deduction equal to the total cost of its use. This arrangement can be advantageous if he is subject to the excess profits tax. At the same time, low interest rates help finance the man who actually owns the equipment he rents or leases to others.

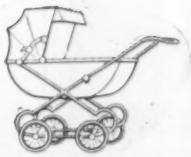
Another effect of the high tax, low interest combination is to make it economically possible to repair old equipment and keep it in service for longer periods. If a user can get the government to stand 80 per cent of the cost of keeping old equipment going, he may often figure he is getting his money's worth out of the 20 per cent that he pays with his own funds.

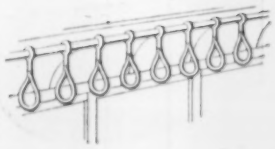
With the passing of the excess profits tax however, we may witness some reversal of both trends. Some who now lease equipment may find it more advantageous to purchase outright. Other users who now maintain old equipment at high cost may find it advantageous to replace it with new. This is particularly true if we are allowed to set our own depreciation rates.

Mr. Friedman

To service the thousands of large and small steel consumers with material to exact specifications, a great change is occurring in the steel warehouse industry. Formerly, it was possible for the steel warehouse to stock standard sizes, grades and finishes of material for off-the-shelf delivery. However, due to considerable increase in labor rates at both producing and manufacturing level, as well as the high cost of transportation, it is now necessary for steel mills to produce steel in large economical runs. Therefore, the warehouse with only a stock of standard items will be unable to satisfy the demands of many of the manufacturers of metal products.

These consumers require a supplier capable of offering immediate delivery of both large and small quantities of material processed to meet exact production requirements of size, physical properties and finish. Thus, the steel warehouse of today must not only





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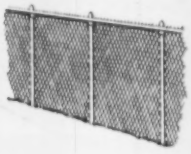

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Jervis B. Webb Co., Detroit

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stock material but operate such processing equipment as shears, slitters, edge rollers, flame cutting units, sheet levellers, temper rolling mills, grinders, pickling plants, heat treating and annealing units, etc., in order to properly satisfy its customers' needs.

Mr. Webb

Conveyor industry seems to be holding its own despite a slackening in the over-all capital goods industry, indicating possibly that demand for conveyors, based on cost saving possibilities, may buck any trend against equipment purchases. The capital goods industry noted recently that dollars and space spent and used for plants had been increasing, but at a rate considerably under dollars spent for capital equipment; in other words, undoubtedly more automatic equipment per amount of plant.

Two conclusions might be derived from this: Conveyorization making use of plants in a third dimensional way, such as under the floor and up in the trusses, as well as on the general work line have made this possibly physically; mechanization of handling and automation, which essentially involve conveyorization, must be a good part of the reason for the dollar rise in the ratio.

Country's population is increasing at a higher rate than perhaps ever, but the working population available for the next decade is not increasing in proportion. Necessity is more productivity per mand. The solution: Mechanized, conveyorized manufacturing and handling.

Mr. Black

Present applications of vapor-phase packaging extend into practically every field and include not only packaging for final shipment but also for inter and intra plant shipments. Vapor phase protection is also being used for inhibiting rust and corrosion during processes, eliminating multiple greasing and degreasing operations on highly corrosive parts. In many plants, inhibitor-treated paper is standard equipment for wrapping expensive tools and dies for storage.

Manufacturers of heavy machinery are using vapor barrier wraps for protecting outer surfaces while crystals and aqueous solutions are used to protect interiors of gear boxes and other enclosed mechanisms.

Consumer goods, particularly hardware and small tools, are being packaged in treated envelopes bearing informative notes regarding the vapor

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phase packaging and suggesting the item be kept in the envelope when not in use. Adoption of this type of protection is eliminating a big headache for retailers, long plagued with expense of replacing tools rusted on the shelf. This problem has been severe enough, in past years, to force many manufacturers to the use of stainless steels for many hardware items. Elimination of the rusting problem may lead to return to carbon steel to improve competitive position.

Mr. Baldinger

Manufacturers of gas-powered industrial trucks have been plagued with the shortcomings of one of the most important parts of the truck—the clutch. This friction device of revolving plates has been the weakest point in gas-powered truck design, because of the uncontrolled human element and constant start and reversal motions. Due to the heavy abuse it is not unusual to replace clutches in some installations once a week. This replacement cost leads to a greater cost—downtime— and kept engineers struggling to find a suitable solution.

It was not until early this year, with introduction of a gas truck with electric transmission that the problem was considered solved. Method is simple; it eliminates the clutch entirely. The electric transmission has no mechanical connections between engine and drive unit. It is fully automatic in action and entirely eliminates transmission gears, gear shifting and engine shock due to clutching. Yet inherently this electric transmission has all the features of torque converter, overdrive and free wheeling action. This type of drive has high output efficiency resulting in sizeable fuel savings.

Mr. Sears

As business returns to normal, more and more attention must be given to costs. Labor and raw materials hold little promise of softening. In many instances price structures will have to be adjusted to a competitive market, and in the squeeze between cost and selling price, there will often be little room left for profits. For many industries, tomorrow's profits will depend to a large extent not on how much can be made, but rather on how much can be saved. There is only one place where many manufacturers can effect economies, and that is in their materials handling procedures. Too many rely on old-fa-

JOHN A. BALDINGER
General Manager
Automatic Transportation Co., Chicago

LESTER M. SEARS
Chairman, Towmotor Corp.
Cleveland

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C. B. SMYTHE
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Lorain, O.

shioned, costly manual methods. Many others are still using equipment that has been written off long ago and should be replaced with modern equipment.

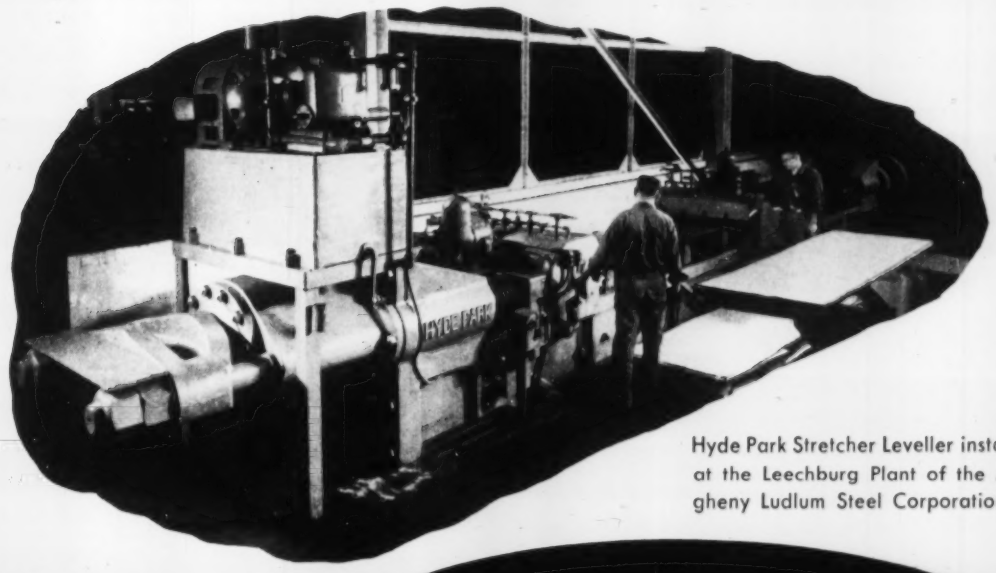
For example, never before have new model fork lift trucks offered so many major improvements. They are calculated to achieve economy and efficiency. One example: TowmoTorque Drive now makes lift truck operation practically effortless. You don't even have to steer, in the accepted sense, because power steering does 80 per cent of the work. Many other engineering achievements and accessories enable trucks to handle more different kinds of loads with outstanding efficiency.

Mr. Smythe

One trend in material handling is expansion of outside storage and warehouse facilities for items weighing a few pounds to 50 or more tons. This has developed simultaneously with our vigorous wartime and post war industrial plant growth. Such expanded use of outside storage operations is partly attributable to expanded application of free-moving cranes. These units have two basic operating characteristics: Ability to revolve thru 360 degrees and ability to travel on crawlers or high speed rubber-tired mountings, free of restrictions.

In this way, cranes can reach and utilize all parts of the storage area, and further, permit revision of the storage plan at any time improvement presents itself without interference from predetermined layouts.

Free-moving cranes lend themselves to efficient handling of a wide variety of materials whether bulk, packaged or unit pieces. It may be said such equipment can handle as



Hyde Park Stretcher Leveller installed at the Leechburg Plant of the Allegheny Ludlum Steel Corporation.

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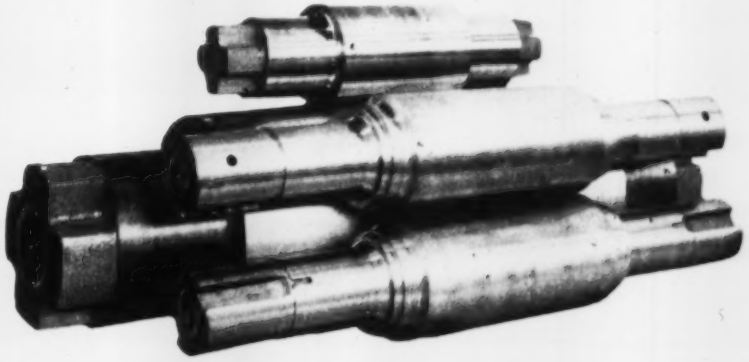
In this period of increasing competition when high production costs can so easily disrupt sales, Hyde Park Rolls and Hyde Park Rolling Mill Equipment take on a new order of importance; for Hyde Park means efficiency. Yes, smoother operation, less maintenance cost, more economical production.



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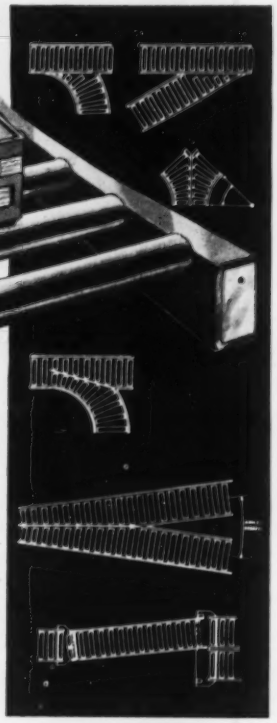

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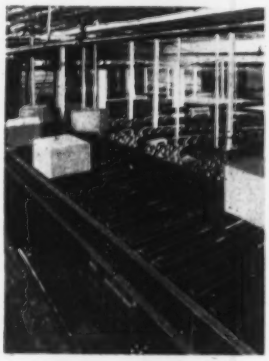

Typical combination system utilizing live rollers and gravity wheels.

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SAMUEL W. GIBB
Vice President, C & D Batteries Inc.
Conshohocken, Pa.

ROBERT F. RICE
Manager, Material Handling Department
Whiting Corp., Harvey, Ill.

many different types of materials as there are attachments for the crane hoist line.

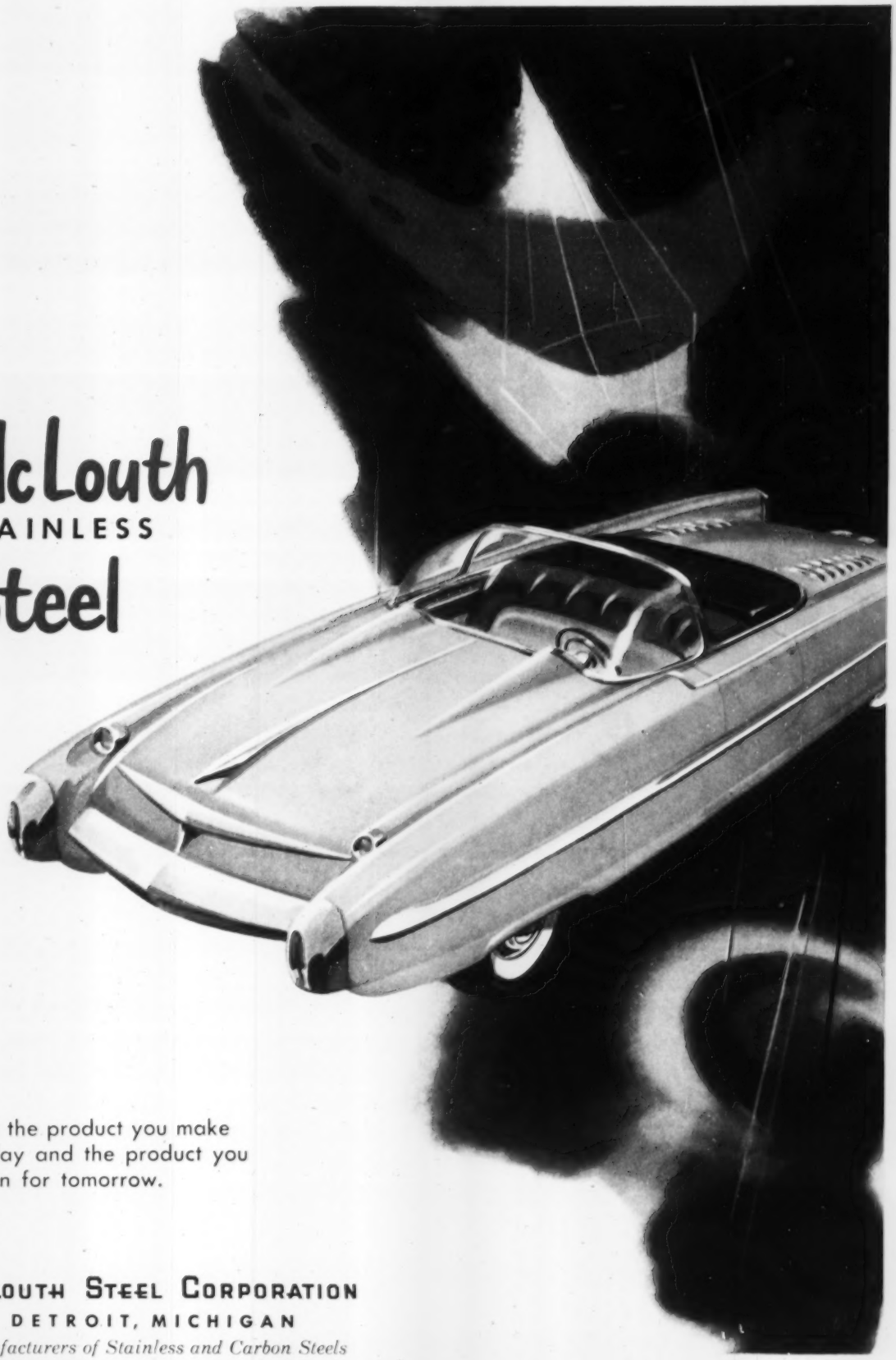
☑ Mr. Gibb

Technological developments in heavy-duty batteries of interest to the steel industry relate to two basic battery characteristics—power capacity and battery life. In these two essentials marked improvements have been researched, developed, tested and proved.

Use of multiple layers of glass fiber for insulation and retention of active material has eliminated shedding as a basic problem in battery life. Application of the same design principle has facilitated increasing power capacity without deviation from sound engineering principles. The effect of these developments is a substantial improvement in battery life expectancy and power capacity as well as a material reduction in total capital investment.

☑ Mr. Rice

Electric overhead traveling crane of the future will be designed with more regard for safety and comfort of the operator. Cranes will be equipped with comfortable seats, finger-tip controls,



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President, Rapids-Standard Co., Inc.
Grand Rapids, Mich.

clear vision of floor areas and controlled cab temperatures. They will have more automatic equipment, such as centralized lubricating systems, power brakes and full magnetic controls.

The trend is to use more power devices to reduce manual effort and overcome operator fatigue. Just as the average automobile today is equipped with many features which were accessories a few years ago, so overhead cranes will be equipped with more labor-saving devices in the future.

Mr. Sebastian

Strong trend in metalworking to apply principles of continuous flow movement to operations previously overlooked has been developed by automation engineers in their search for better results and lower costs. It results in elimination of batch handling of parts and the substitution of many different types of conveyors to handle single parts or small trays of parts. The trend has continued in use of conveyorized rack storage to increase storage capacity, lower cost and provide first in, first out inventory control.

There is increased emphasis on built-in safety features, and upon simplified maintenance and adjustment features. Increased use of conveyors in operations that are subject to constant change, in turn, has created a demand for conveyor units that are highly versatile and that can be easily changed to meet changes in methods.

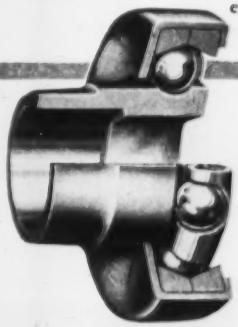
If the conveyor industry is to keep pace with the automation engineers, there is considerable development work to be done in coming months. Result should be greater mechanization, increased safety, simplified maintenance and more versatile conveyorization throughout the metalworking industry.

Important low-friction bearing development for conveyor rolls

NOTE THE DIFFERENCE

CONVENTIONAL TYPE BALL BEARING. Arrows in this illustration indicate the unavoidable friction when the balls are in contact with each other.

LOGAN X-SERIES BALL BEARING. Balls are caged in a steel container. Binding and friction caused by balls contacting each other is eliminated.



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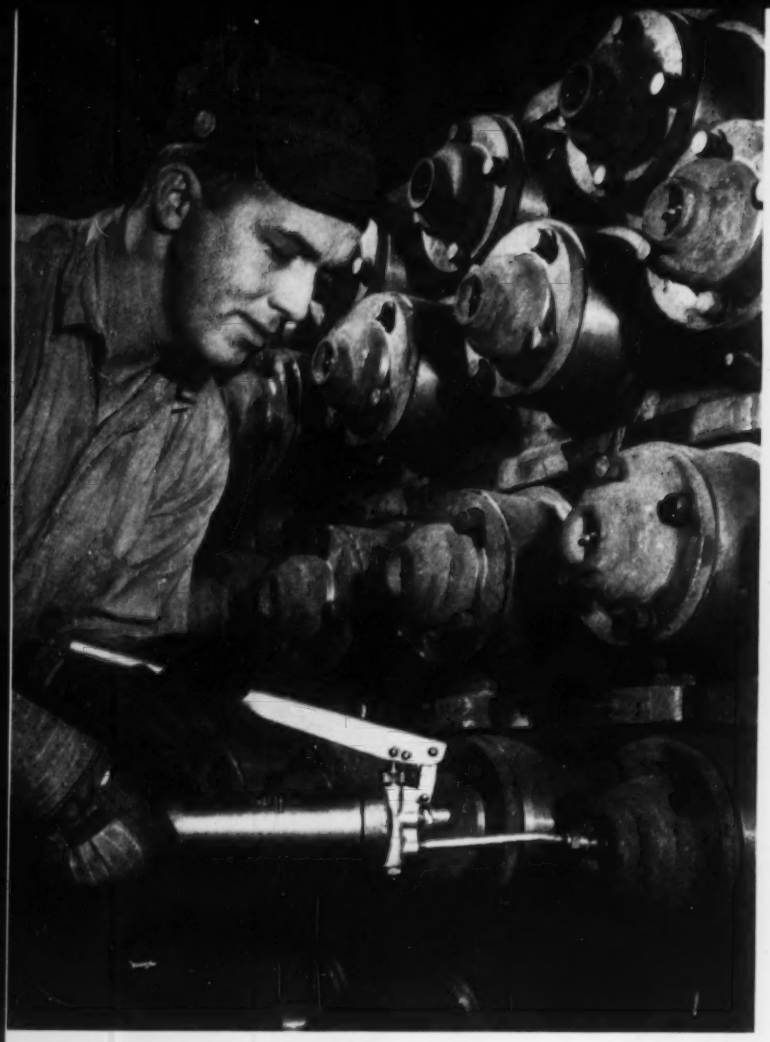

TECHNICAL PROGRESS

Lubrication

STEADY PERFORMANCE of high-speed machinery over the long pull is a key role in production savings. Effective lubrication is a must for this continued operation and metalworking men are employing automatic lubrication systems in ever-widening areas.

Centralized systems will become the standard approach to getting lubricant to critical areas. Sweeping trend is the installation of central systems as part of original equipment. These are either hand-operated or automatic systems, but both guarantee delivery at the right time, on time.

Expanded use of lubricants for corrosion prevention promises alleviation of many acute surface-preservation problems. Water-shedding greases and other lubricants are being developed and applied which have an inherent ability to inhibit corrosion—this in addition to their excellent lubricating qualities.

Many production men are now making intensive surveys to determine their lubricant needs with the idea of standardizing on a minimum number of lubricants for all applications. Special-purpose lubricants will remain as the only answer to many job requirements, but whenever possible, general-purpose oils and greases will be used to reduce purchasing, inventory and handling problems.

Mr. Fox

Today, and within the foreseeable future, two major trends are well established, and can be summarized as: Standardization on fewer grades and types of lubricant utilized; and standardization on automatic, centralized systems for assuring the application of the right lubricant, in the right quantity, at the right time, while machines are operating.

Reason for the first trend is merely an inevitable projection of management's endeavor to bring the proved economies of standardization to every plant operating category. Reason for the second trend is less obvious, but is the result of management's continuous search for better methods which will reduce operating costs, plus the unalterable fact that modern machine design, and the increasing automation of production methods have obsoleted lubricant application devices relying on the human element.

To all industries, these central systems guarantee such advantages as: Elimination of machine downtime for lubrication; reduced investment in large and costly stocks of repair and replacement parts, power requirements consistent with work produced, improved product quality, and elimination of personal injuries attributable to lubrication with a corresponding reduction in compensation costs.

Mr. Critchlow

Much is heard these days of the increasing intensity of competition or a return to a buyer's market. Such signs do not necessarily mean that a depression or recession is in the offing. As a matter of fact, a buyer's market can be a healthy market because it taxes the ingenuity of the manufacturer to produce his products more efficiently and to design or develop new and improved products.

In the steel industry, particularly, one of the major items of manufacturing expense and one which comes under close scrutiny during periods of stiff competition is operating costs. Lubricants and lubrication are recognized as a part of operating costs. However, a fact that is not always recognized is that lubricants and lubrication can affect operating costs to a far greater degree than the mere cost of the lubricants and lubricating devices.

For instance, the wrong lubricant or a lubricant of poor quality can, and very often does, cause machine failure resulting in costly production delays. Substituting cheaper lubricants for quality lubricants can increase operating costs far beyond the few dollars saved in the reduction of the cost of the lubricants.

Mr. Witzenburg

Everyone recognizes—and many are amazed—at the rapid trend in recent years toward complete automation in the metalworking industry. The modern industrial designer is working toward the pushbutton plant with the least possible dependence on the human element.

Centralized lubrication has done much to make this automation possible. It would be entirely practical to build a plant today in which one operator sitting in a small office could push a few buttons and lubricate every bearing in the whole plant within the space of a few seconds. Or if he did not want to tire himself by pushing buttons, the lubricant could be handled by an electrical or mechanical timer.

Furthermore, the lubricating job in such a plant would be done much better and more thoroughly than by hand methods. Each bearing would get the right amount of grease or oil—at the right time. None would be missed, starved or overlubricated as would be the result with dependence upon the human element.

Because more and more automation does make sense to industry—and is necessary to maintain the American way of life—centralized lubrication will continue to assume an ever-greater importance in modern machine design.

Mr. Thomas

In many of our major industries today, operation and maintenance officials are taking more advantage of modern solutions to their age-old lubrication problems. In a few industries, however, there is still much room for improvement.

Machinery designers in most cases, are quick to recognize the importance of lubricants and their application. Their problems in designing higher production machines all point up the importance of supplying the right lubricant in the right quantity at the right time. Availability and use of specially formulated oils and fully automatic lubrication are tak-

ALEX P. FOX
President, Lincoln Engineering Co.
St. Louis

JOHN P. CRITCHLOW
Chief Fuels-Lubricants Engineer, Rolling Mill Section, Gulf Oil Corp., Pittsburgh

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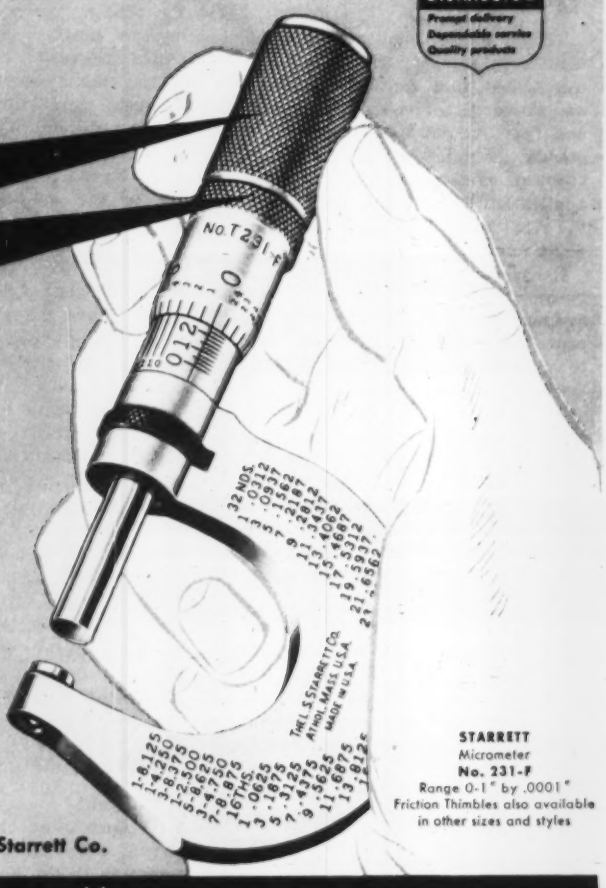

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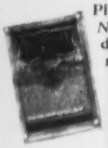

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Editor, LUBRICATION, Technical & Research Div., Texas Co., New York

CHARLES T. STONE
Sales Engineering, Esso Standard Oil Co. New York

JOSEPH A. RIGBY
Vice President, Brooks Oil Co. Pittsburgh

ing attention away from routine maintenance, and putting it back where it belongs—on productive output of the machine.

Higher speeds, more power, greater loads and more precision are all essentials of machines yet to come. Each of them makes proper and adequate lubrication increasingly important. Great as the developments have been in the past, companies which supply lubricants or lubricating systems are continously working on products and methods to solve problems yet to come. The technology of centralized automatic lubrication is keeping pace with today's advances in machine design—and is aimed towards tomorrow's plant with complete automation.

Mr. Youngclaus

Most recent important trend in industrial lubrication is the movement toward honest evaluation of the results of productive maintenance programs produced through modern lubrication engineering methods. This can be accomplished by using, as a yardstick, the increased value given the capital investment in production machinery by extending its productive life. Thus, aggressive management is given a true picture of productive costs and the effectiveness of its maintenance control procedures.

Introduction of automation already has shown American industry that it must prepare itself for the coming of more and more automatic machines and devices. With this they will have to co-ordinate the efforts of the lubrication engineer, machine designer and lubricant supplier to produce machines with proper lubrication systems, bearings, gears and other machine components which will require the least maintenance attention and, therefore, produce more goods and more dollars per day. There will be new bearing materials and new lubricants and new application devices, all of which will combine to make the factory of tomorrow as automatic as possible.

Education programs are already prepared to co-operate with industry to train industrial plant personnel to cover all these important future developments.

Mr. Rigby

Corrosion is one of the serious problems encountered in the steel industry. It has become so acute and costly that technical committees have been organized and are active in making a comprehensive study to minimize the damage.

One practice which has been used is coating with zinc, lead, tin, copper and alloy materials. This gives good results in protection against corrosion, but inadequate results in enduring performance. Another practice consists of painting with materials in the nature of paint, but with basic composition, or chemical addition and processing, to offer the utmost in protection. These materials serve a purpose, but are costly and not all that can be desired.

Gradual, but effective developments with petroleum products have been those of compounding base oils with additives not only to prevent wear, but to minimize corrosion. Foremost in this has been the use of lead.

Sticky or highly adhesive lubricants are now available which can be easily applied and which will serve as protective coatings to resist salt spray, dilute sulphuric acid, moisture and other contributing factors.

Mr. Brewer

Trend towards mechanized lubrication is one of the highlights in the development of greater production from modern steel mill machinery. Mechanized lubrication has enabled the petroleum industry to co-operate more completely with mill personnel in selecting or developing lubrication oils and greases capable of meeting intensive operating conditions.

The forward thinking of the steel industry in appointing qualified lubrication engineers and regarding mill machinery lubrication as a science rather than a chore, has contributed to the co-operative activities of the petroleum chemist and research laboratory. The steel mill lubrication engineer today can bring his problem to the petroleum research laboratory before it becomes a problem.

He and his staff can bring to the petroleum research laboratory performance data and information on current and proposed operating conditions. With these data a co-operative program of laboratory plus mill research can be established. This pays off because the steel industry can obtain the most modern types of lubricants when machinery goes into operation, rather than waiting until some mechanical failure develops.

Mr. Stone

Modern production practices are imposing ever greater burdens on machines and lubricants. Higher speeds and higher loads on bearings and gears are the result of the need for increased production. Gears which transmit power to industry's machines require lubricants which can withstand the high shock loading to which they are so commonly subjected in meeting today's production requirements.

Extreme pressure lubricants have been available to meet these requirement for many years. Over the years, various types of extreme pres-

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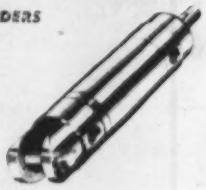

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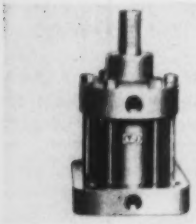

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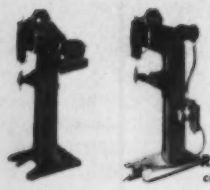

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REAMERS
bulletin 153

REMOTE CONTROLS
catalog 645

C. T. LEWIS
Chief Lubrication Engineer, Republic Steel Corp., Cleveland

sure lubricants have been used and many have been found lacking in some respects. Continuous effort by petroleum scientists has, however, resulted in today's extreme pressure lubricants which protect our industrial gearing. Incorporation of extreme pressure additives helps prevent rupture of the lubricant film by high instantaneous loads. Metal to metal contact is thus minimized with resulting improved gear life.

Recent developments in extreme pressure industrial lubricants have made them suitable for more widespread use. Products are now available which have oxidation stability approaching that of well refined straight mineral oils. The corrosion problem which beset many early developments has been overcome and many of these lubricants actually afford rust protection. Water separation has been improved for more efficient lubrication.

These improvements result in lubricants which can be widely used to protect the power transmission gearing of today's overworked machines.

Mr. Lewis

Yesterday's ideas are today's practices and may well be tomorrow's history. Current developments in lubrication are principally being made in new lubricant materials, although continuing education in the design and application of bearings and seals is increasing the savings from proper lubrication practices as is reflected in lower over-all maintenance costs.

Due to increased stress on lubricant additives, many lubricants in critical applications have improved in usefulness. Only a short time ago great difficulty attended their application and use.

Necessity for the preservation of metallic surfaces, both within bearing assemblies and otherwise, has led to

VANCORAM PRODUCTS

PRODUCT	TYPICAL COMPOSITION	APPLICATIONS
ALUMINUM ALLOYS		
Alsifer	Aluminum 20% Silicon 40% Iron 40%	Used principally as a steel deoxidizer and for grain size control.
Deoxidizing Grades	Aluminum 85 to 99%	Standard grades.
Silicon Aluminum	Silicon 5 to 20% Aluminum Bal.	For sand, permanent mold and die casting.
Titanium Aluminum	Titanium 2½ and 5% Aluminum Bal.	For grain refinement and improved physical properties of commercial aluminum alloys.
Vanadium Aluminum	Vanadium 2½, 5, 10% Aluminum Bal.	For control of thermal expansion, electrical resistivity, and grain size of commercial aluminum.
BORON ALLOYS		
Ferroboron	Boron 14 18% Carbon 1.50% Silicon max. 5.00% Aluminum max. 0.10%	For adding boron to steels and irons.
Vanadium Grainal No. 1	Vanadium 25.00% Aluminum 10.00% Titanium 15.00% Boron 0.20%	Practical and economical intensifiers, for controlling and increasing the capacity of steels to harden, and for improving other important engineering and physical properties.
Grainal No. 79	Aluminum 13.00% Titanium 20.00% Zirconium 4.00% Manganese 8.00% Boron 0.50% Silicon 5.00%	
CHROMIUM ALLOYS		
Ferrochromium Briquettes	Hexagonal. Weigh approx. 3⅛ lb., contain 2 lb. of chromium.	A practical and convenient form for adding ferrochromium to the cupola.
High Carbon Grade	Chromium 66 70% Carbon 4 6%	For wrought constructional steels and steel and iron castings.
Iron Foundry Grade	Chromium 62 66% Carbon 4 6% Silicon 6 9%	For alloyed cast irons. Ladle addition readily soluble at lower temperatures of cast iron.
Low Carbon Grades	Chromium 67 72% Carbon .06%, .10%, .15%, .20%, .50%, 1.00% and 2.00% max.	For low carbon chromium steels, especially those with high chromium content, such as stainless steels and heat-resistant types.
Exlo Max. .025 Carbon Grade	Chromium 67 72% Carbon max. 0.025% Silicon max. 1.00%	A special extral low carbon ferrochromium with high chromium to carbon ratio, high density and exceptional cleanliness. Especially adapted for use in .03 C max. stainless and other stainless steels, heat resistant and alloy type metals.
Max. .06 Carbon Grade	Chromium 67 72% Carbon max. 0.06% Silicon max. 1.00%	A special low carbon ferrochromium similar in characteristics to max. .025% carbon grade but for use where the extra low carbon content is not as essential.
Low Carbon Ferrochrome-Silicon	Chromium 39 42% Silicon 40 42% Carbon max. 0.05%	Used in stainless steels to reduce chromium oxide from slag and to add chromium to steel.
Experimental Ferrochrome-Silicon Alloy	Chromium 48 52% Silicon 25 30% Carbon max. 1.50%	For simultaneous addition of chromium and silicon to low alloy steels and cast iron.
SILICON ALLOYS		
Ferrosilicon Briquettes	Two sizes, both cylindrical. The smaller contains 1 lb. of silicon; the larger, 2 lbs. of silicon.	A practical and convenient form for adding ferrosilicon to the cupola.
25 30% Grade	Silicon 25 30%	To deoxidize open hearth steels and add silicon to cast iron.
50% Grade	Silicon 47 52%	To deoxidize and add silicon to steels and cast irons.
Silblok 25 & 50	Same as above	Blocking grades especially processed to give high density, uniform analysis, greater cleanliness.
65% Grade	Silicon 62 67%	For deoxidation and for addition of silicon to high silicon steels.

PRODUCT	TYPICAL COMPOSITION	APPLICATIONS
SILICON ALLOYS *(continued)*		
75% Grade	Silicon 74 79%	For high content silicon steels.
80 85% Grade	Silicon 80 84.9%	For high silicon addition to steel, for slag treatment and graphitization of iron; for making magnesium.
85 90% Grade	Silicon 85 89.9%	
90 95% Grade	Silicon 90 95%	
Silicon Metal	Silicon min. 96%	For making aluminum, other nonferrous alloys and silicones.
SPECIAL FOUNDRY ALLOYS		
Graphidox No. 4	Silicon 48 52% Titanium 9 11% Calcium 5 7%	Graphitizer for high strength cast irons; reduces chill; supplementary deoxidizer for cast steel.
Noduloy Alloys (Various Types)	Magnesium 5 16.5% Silicon 37 67% Copper 0 18% Iron Bal.	Magnesium-containing alloys for addition to molten cast iron for manufacture of nodular iron.
V-5 Foundry Alloy	Chromium 38 42% Silicon 17 19% Manganese 8 11%	To reduce chill and increase strength and hardness of cast iron.
TITANIUM ALLOYS		
Ferrotitanium High Carbon Grade	Titanium 15 18% Carbon 6 8%	To control rimming action and deoxidize steel.
Medium Carbon Grade	Titanium 17 21% Carbon 3 4.50%	To deoxidize and to add titanium to killed steels.
Low Carbon Grades 25% Titanium	Titanium 20 25% Carbon max. 0.10% Silicon max. 4.00% Aluminum max. 3.50%	Carbide stabilizer in high chromium corrosion-resistant steels of extremely low aluminum content. Deoxidizer for some steels.
25 32% Titanium Special	Titanium 25 32% Carbon max. 0.10% Silicon max. 4.00% and 5.00% Aluminum max. 1.50 to 5.00%	Alloy of high titanium to aluminum ratio for adding relatively large amounts of titanium to stainless and heat-resistant steels.
40% Titanium	Titanium 38 43% Carbon max. 0.10% Silicon max. 4.00% Aluminum max. 8.00%	Carbide stabilizer in high chromium corrosion-resistant steels.
VANADIUM ALLOYS		
Ferrovanadium Iron Foundry Grade	Vanadium 38 42% Silicon 7 11% Carbon about 1%	Imparts remarkable improvement in physical properties of iron with no sacrifice of machinability.
Grade A (Open Hearth)	Vanadium 50 55% Silicon max. 7.50% Carbon max. 3.00%	For low vanadium steels and vanadium cast irons.
Grade B (Crucible)	Vanadium 50 55% Silicon max. 3.50% Carbon max. 0.50%	For tool steels and other high vanadium steels requiring a limited silicon addition.
Grade C (Primos)	Vanadium 50 55% 70 80% Silicon max. 1.25% Carbon max. 0.20%	For making the highest vanadium and the lowest silicon additions to tool steels.
Vanadium Metal 90% Grade	Vanadium 91.15% Aluminum 2.25% Silicon 0.50% Carbon 0.17%	For special iron-free (non-ferrous) or low iron alloys or low impurity ferrous alloys.
99.7% Grade	Vanadium 99.7%	Principally for research on the properties of pure alloys.
Vanadium Pentoxide, Tech. Fused Form	V_2O_5 88 92%	A source of vanadium in basic electric furnace steels. A base for numerous chemical compounds.
Air-Dried Form	V_2O_5 83 85%	Base for chemical compounds.
Ammonium Meta Vanadate, Tech.	NH_4VO_3 min. 99%	For making sulphuric acid, synthetic organic compounds and vanadium chemicals.

Also special alloys, chemicals and metals of Aluminum, Chromium, Silicon, Titanium and Vanadium.

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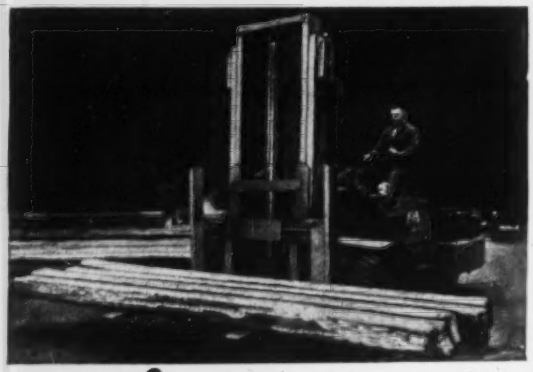

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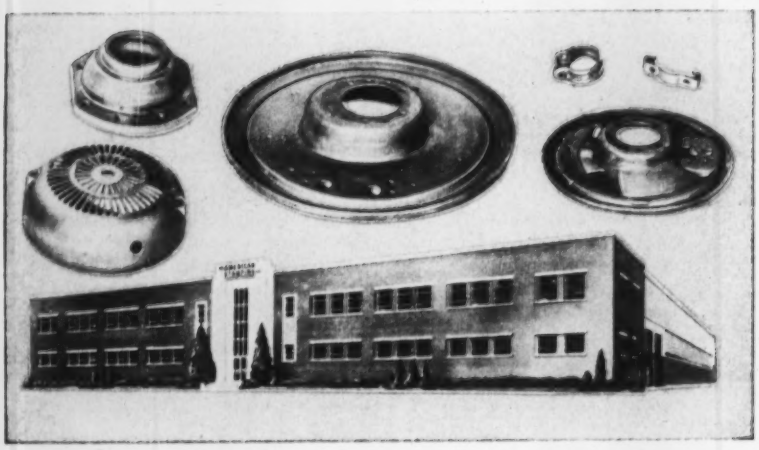

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JOHN R. MC COY
Manager Technical Service, Hanan-Crane Corp., Lebanon, Ind.

renewed activity in anti-rust and anti-corrosion materials and has shown promise of additional more effective agents for the future. These will apply not only to lubricants, but to protective coatings or slushing compounds for steel shipments.

Many of our machine tools, our materials handling equipment and our process regulations and control installations are hydraulically operated. This, in many cases, imposes a real fire hazard and has led to continued research and development of initially nonflammable hydraulic fluids.

☑ Mr. McCoy

Thousands of dollars can be saved each year and production can be greatly increased by planned preventative maintenance programs. Oil filtration should play a big role.

Filtration is highly desirable whether the oil is used as a lubricant, a quenching medium, or coolant. Filtration on a continuous basis is the best method. By continuous filtration, the oil will remain clean at all times thereby preventing harmful contaminants from causing wear to the machinery. Machinery will last almost indefinitely if it is allowed to operate on clean oil at all times. Changing or reclaiming the oil at intervals is far less effective than continuous filtration. The use of additive type oils does not remove the need for good filters.

Combination filtration and water stripping equipment operating continuously on vacuum pumps will eliminate changing oil, drying out of pumps, and downtime caused by excessive wear. Filtration of cutting oils and coolants results in increased production, less rejects, longer tool and oil life, better finish, less downtime, longer periods of operation between wheel dressings, and better over-all efficiency.

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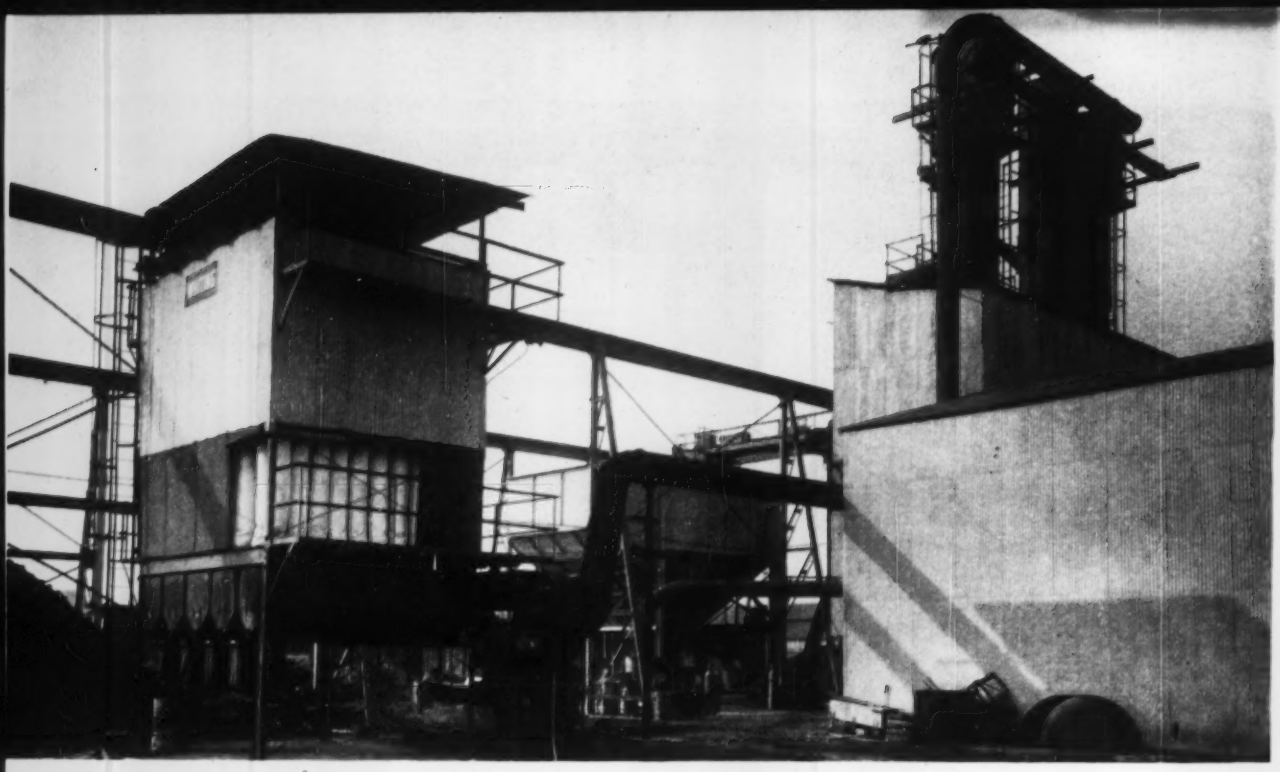

TECHNICAL PROGRESS

Service and Maintenance

COSTWISE, corrosion still commands the greatest maintenance effort. Chemically inert resins allow a new concept of surface protection with paints that withstand heat, constant exposure to weather or chemical attack. Mastics are being extended to many types of corrosive environments.

Emphasis on fire prevention will point up the deficiency of spot protection alone. Both manufacturers and underwriters look to complete automatic systems based on specific flash point and composition of material protected. First step: Current hassle over roof composition will be resolved by eliminating all combustibles from new construction.

Recognition that employees' productivity is influenced by environment continues to push levels of illumination upward. Mercury lamps, especially color-improved types, will serve additional special applications. More machinery will include supplementary lighting for point-of-work clarity.

Missionary phase in employee safety is moving into the background. Now more important are new equipment and techniques. These will include frequency-modulated communications systems to co-ordinate activity, plus detecting and measuring instruments to control toxics.

Exterior dust and fume control promises more effective integral enclosures for dust-producing equipment; recovery apparatus developing higher efficiencies on finer particle sizes; improvements in continuous operating-continuous rapping techniques. Simpler, more accurate air pollution test methods are vital.

Mr. Vedder

From an industrial relations standpoint, modern management demands clean, pleasant conditions within the work place. Making the place of employment as pleasant as possible pays off in increased production and reduced employee turnover. Good community relations are alone of sufficient importance to discourage exhausting fumes and dust to surrounding atmosphere. In addition, however, air pollution control ordinances are becoming more numerous and exacting. In many industrial problems, value of materials salvaged through effective control and collection systems contributes materially toward paying for initial and operating costs.

Advances in dust and fume control systems and equipment center principally around more effective integral enclosures for dust producing equipment; recovery equipment developing higher efficiencies on finer particle sizes; continuous operating type collecting equipment; and simpler, more accurate air pollution test methods. In the field of cloth filters, much progress has been made in extending application to higher temperatures and chemical problems through the use of synthetic fiber filter media. A number of large installations have been completed during the year and operating results are being watched with much interest. Advances in the design and development of continuous operating cloth filters also serve to extend the field of application.

Mr. Ryan

Management is showing an increasing interest in making operations safer for employees, equipment and plant property. For that reason I believe metalworking accident frequency and severity rates will go still lower in 1954. An important advance is greater recognition being given to the "safety man." Whatever his title, he is being elevated to management level. This is a trend sure to mean greater employee safety because it puts the complex problem in the hands of a trained, expert specialist.

Technological developments will help make his job easier. Among these: A frequency-modulated communication system for use between stationary points in the steel plant on the one hand, and cranes, ore unloaders, yard locomotives and other moving vehicles on the other. This promises to be of great help in promoting safety as well as efficiency.

There are other areas in which the safety equipment industry expects to make significant progress in 1954. One is the problem of noise abatement. Another is in the field of instrumentation principally detecting and indicating instruments for effective control of toxic and explosive gases and dusts, dust-measuring apparatus and related developments.

Mr. Gallaway

Advancement in industrial safety parallels industrial progress. Industrial development during the last forty years has been implemented by industry's attitude toward the employee. Today's workman labors in a safer and healthier environment, with resultant improvement in his efficiency and production.

High objectives that were set years ago for the industrial safety movement are being re-emphasized periodically. Today, safety is an integral part of the engineer's planning so that industrial operations and personal protective devices are designed to make tomorrow's processes safe and efficient.

Mr. Ytterberg

Of primary consideration on the part of industrial management is the necessity of lowering unit production costs and reducing maintenance expenses. Investing in quality construction helps assure achievement of these aims. Development in construction, where floors are a vital factor, is growth of large distribution and warehousing centers, where maximum load-bearing qualities and ease of material handling are of primary importance. Decentralization of industry, with erection of new plants in strategic locations, is of course still an industry objective and will account for a steady demand for heavy-duty floors.

Although total new construction appears to be holding at record highs, we feel there will be some falling off in 1954. Taking up this slack, however, is a steadily increasing demand

C. O. VEDDER
Manager, Dust Control Department
Pangborn Corp., Hagerstown, Md.

J. T. RYAN JR.
President
Mine Safety Appliances Co., Pittsburgh

C. H. GALLAWAY
General Manager, Safety Products
American Optical Co., Southbridge, Mass.

CARL F. YTTERBERG
President, Kalman Floor Co.
New York

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(ANSWER NUMBER 4)

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*Write for reprint of article from Oct. 19, 1953 issue of STEEL.

I-4

A VERSATILE FAMILY OF *Tool and Die Steels*

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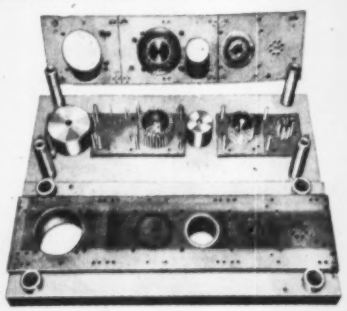
Certain steels or families of steel stand out as having almost universal application for general use, ranging from moderate to high production as job requirements demand. One such Firth Sterling family of steels consists of CROMOVAN, AIRVAN, and INVARO. CROMOVAN and AIRVAN are air hardening; INVARO is oil hardening.

ANALYSES

	CROMOVAN	AIRVAN	INVARO
Carbon	1.60%	1.00%	.90%
Chromium	12.50%	5.25%	.50%
Vanadium	1.00%	.25%	.20%
Molybdenum	1.00%	1.15%	—
Manganese	—	—	1.15%
Tungsten	—	—	.50%



Generally speaking, CROMOVAN is intended for long production runs where hundreds of thousands or millions of pieces must be produced at minimum cost; AIRVAN for intermediate runs where toughness and high abrasion resistance are also requirements; INVARO, an oil hardening tool steel for all other general use.

Full technical details are available in these free bulletins. Write for them today or ask your Firth Sterling representative to call and discuss your tool and die needs . . . steel *or* carbide.

P-1

Firth Sterling

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W. B. COTT
Sales Manager, Air Conditioning Division
Westinghouse Electric Corp., Boston

for resurfacing. By this is meant complete installation of new topping placed over existing underslabs, not patchwork. Resurfacing by this method is an economical approach to new flooring and is becoming highly attractive to cost-minded industrialists.

We face an economy-conscious buyer in 1954, and hard-topped, heavy-duty granolithic floors, either through original installation or by resurfacing, we feel, will be a profitable selection for major concerns.

Mr. Hognander

Developments in floor cleaning equipment reflect the fact that floors are important material handling traffic ways. New machines are geared to this. Instead of the 3 or 5-hp industrial floor machines of a year or so ago, new models range up to 25-hp or more, with V-type engines. And, to work with traffic flow in busy aisles, large-capacity machines are operator-ridden and have a speed range of about ½ to 11 mph.

Effect of these developments has been marked. Instead of confining cleaning to night shifts at premium rates, floors are cleaned during regular hours. Powered machines simply join other traffic and move at about the same pace, so buildup of dirt and grease on floors can be kept to a minimum. One benefit: Pull tests on trucks moving over grease-caked floors show a power loss running up to 50 per cent.

Power sweepers have also been greatly improved and today are credited with manhour savings ranging from $1000 to $12,000 per unit. Manufacturers have discovered that sweepers must take more abuse. So new models are about 40 per cent heavier than a year ago. Capacities have been increased, too, so coverage in excess of 100,000 sq ft per hour is achieved on heavy-duty models.

Mr. Pietz

Estimates of business cutback during 1954 range from 5 to 10 per cent. There is, however, a healthy attitude in that each manufacturer believes that, due to his particular activities in extra sales effort and cost reduction, he will either hold or exceed his current level. Pressure will be on the plant's service and maintenance personnel to eliminate unnecesary costs in materials handling and processing. Shortening material flow lines through greater plant flexibility and adapting high speed direct production machinery such as punch presses, offer definite possibilities for cost reduction.

Utilization of machinery mounting to eliminate necessity of lagging down machines and to isolate shock forces constitute one aid to increased production flexibility and allow increased operating speed on existing floor structures.

Mr. Hardy

In all industry, maintenance and lubrication are costly but necessary activities. They assume extremely important proportions in the abrasive industry where the nature of the product results in accelerated wear.

A recently-inaugurated program of lubrication is starting to pay off. First, current practices are reviewed, and each item of equipment studied. This is followed by establishment of lubrication schedules. Trained men, supplied with modern lubricating equipment and proper lubricants, carry out the programs. We anticipate substantial maintenance cost reduction by this plan.

Programming and scheduling, while not normally considered maintenance functions are proving helpful in streamlining maintenance work. Detailed analyses of all maintenance jobs are prepared to determine scope of work, parts required, trades involved, most suitable down-time, etc. When accompanied by close follow-up on the part of maintenance supervision, results on maintenance costs are favorable.

While we do not employ maintenance incentives, we are gradually installing standard times. This gives us a valuable tool to use in establishing work loads and setting up repair crews. Perhaps ultimately this will lead to the consideration of incentives, although at the moment we are not contemplating this.

Mr. Cott

Tolerances to ±0.0002-inch at final inspection prior to precision fitting in assembly are tough to gage and assemble when done in hot, humid, dust-laden air. Cutting huge gears requiring days of work can be expensive if temperature conditions cause even minor changes due to contraction or expansion of the metal or tools. The manufacturer has an indispensable ally in this battle for accuracy, low rejects and fatigue. That ally is air conditioning and process refrigeration.

Air conditioning may be installed throughout the entire space; it may be spot air conditioning in an area housing one particular phase of an operation; it may be used to control temperature in storage space to eliminate expansion and contraction or moisture gain; it may be used to provide chilled air diffusion to set finish or product.

One of the basic factors in industry is output per man hour. Thus, air conditioning for human comfort is assuming increasing importance as a means of encouraging increased production through improved working conditions. Where fixed or desirable process air conditions create a range between conditions established for personal comfort, it is possible to

J. J. POWER JR.
Executive Vice President, Automatic Sprinkler Corp. of America, Youngstown

N. T. SHIDELER
Manager, Protective Coatings, Pittsburgh Coke & Chemical Co., Pittsburgh

C. M. CUTLER
Illuminating Engineer, Lamp Division General Electric Co., Cleveland

R. A. BRACKETT
Sales Manager
Spencer Turbine Co., Hartford, Conn.

work out compromise conditions.

Air conditioning or process industrial refrigeration is extremely flexible, easy to install and adaptable to any process where control of temperature and humidity are required.

Mr. Power

Plan of industrial fire protection is today commanding more serious attention than at any time since the initial development of automatic sprinkler systems. At all times management has taken calculated risks, but today the tremendous replacement costs of machinery, equipment and buildings, together with business interruption losses that can occur, make it absolutely essential that complete fire protection be provided.

In an attempt to cut corners industry, as well as insurance underwriters, have permitted spot protection. This means sprinklers were installed in areas where combustible construction or combustible contents were involved. In certain buildings of noncombustible construction, sprinklers were provided only in areas where it was expected that combustible contents were to be placed. Rapid changing conditions found combustible materials in nonsprinklered areas and have contributed to serious fire losses.

Fire protection planning today calls for complete sprinkler protection, with automatically-operated water spray, CO_2 fixed piping foam systems for special hazards. It is only by taking a sound engineering approach to the problem that proper safety can be assured.

Mr. Shideler

Because of the many developments made during the war, industry today is cognizant of the extreme cost of maintenance and replacement of equipment, caused by corrosion. Rapid strides are being made in development of means of combating corrosion using one of three major methods:

1. Proper selection of metal and construction materials for greatest resistance to the corrosion environment.
2. Use of corrosion inhibitors in liquid and vapor phase or in coatings.
3. Use of proper newly-developed or improved protection coatings.

Concerning the latter, rapid strides have been made in improvement of the vinyl coatings, and systematic development of good epoxy type coatings, both baking and air-dry types. Further uses of styrene and other resins are being made, producing coatings to fit many of the requirements of industry.

Improvements have been made in the old reliable coal tar coatings. Some of these are greatly improved in their stability toward exposure to sunlight and corrosion resistance. Work is in progress on combinations of synthetic resins with coal tar pitch in production of new, highly corrosion-resistant coal tar coatings. The hot-applied coal tar pipe line coatings have undergone changes, giving coatings of far better corrosion resistance and application characteristics.

Mr. Cutler

Industrialists are finding more and more that the productivity of a worker may be influenced by his environment. They recognize that the right kind of lighting is an aid to production, and as such, a sound investment. The trend in levels of illumination has been upward; this will continue.

Using light sources and equipment best suited for a particular type of work will proceed at an accelerated rate. I expect fluorescent lamps will supply a large part of the general illumination. Mercury lamps, especially color improved types, as well as filament lamps, will continue to serve more applications.

Much lighting equipment in industrial plants is obsolete in terms of new, improved designs. Newer equipment provides good utilization of light not only on the work, but brightens other surfaces in the space. This is important in creating good seeing conditions.

More and more machinery will include supplementary lighting units built in to provide light for good seeing at the point of work.

There will be greater attention to maintaining lighting systems to get the most light output from them. Cleaning of equipment, and replacement of lamps in groups, before they become inefficient producers of light, will become much more prevalent. This is particularly true as accountants study the economic factors involved and compare group relamping with the expense of individual replacement.

Mr. Brackett

Trend in industrial vacuum cleaning is toward larger portable machines for existing plants and piping of vacuum to a stationary vacuum producer for larger installation. Starting with floor area cleaning, industrialists find that a powerful vacuum can clean 33 to 50 per cent faster than hand methods. Time saved on walls, ceilings and pipes is much more pronounced. Users of heavy duty vacuum find that the same machine could be used also for big jobs of handling hazardous

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ELECTRIC FURNACE

BESSEMER CONVERTER

FOUNDRY

LADLE TRANSFER CARS

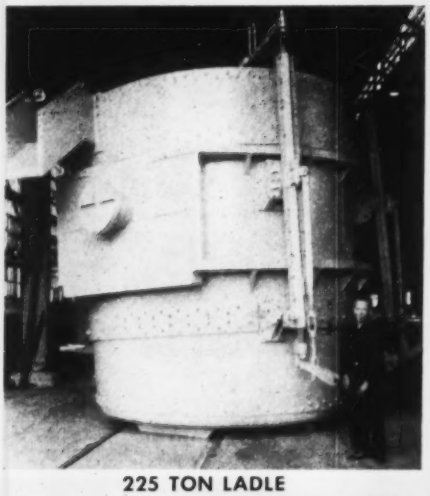
LADLE STANDS

LADLE BAILS

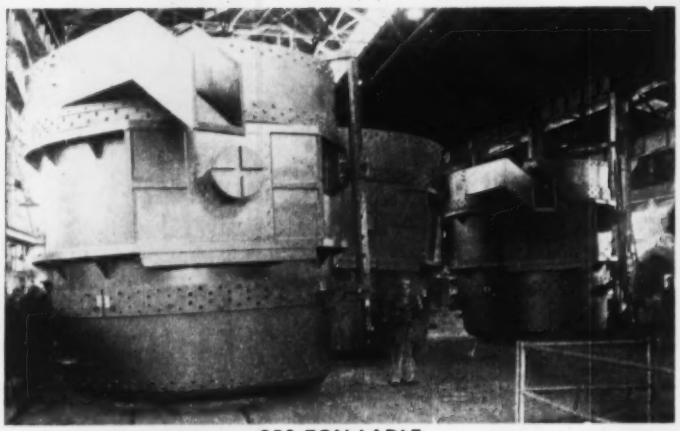
LADLE HOOKS

ALL WELDED LADLES

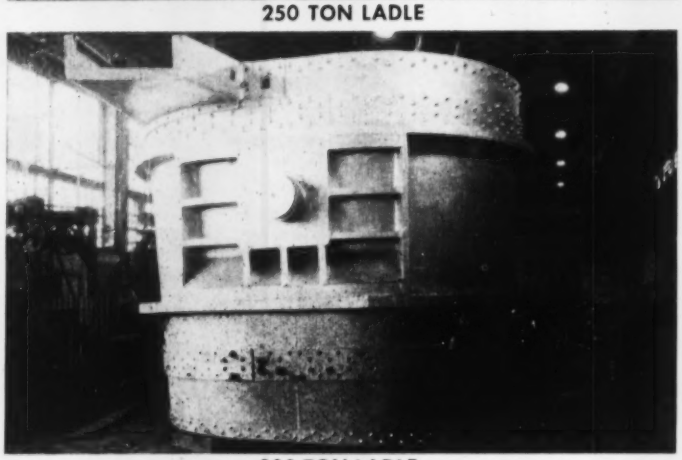
STRESS RELIEVED



225 TON LADLE



250 TON LADLE



300 TON LADLE

DESIGNERS, FABRICATORS AND ERECTORS OF STEEL MILL EQUIPMENT

HARRY M. PIER
General Sales Manager
Research Corp., Bound Brook, N. J.

materials and conveying loose materials by the ton.

Engineers are applying vacuum on the production line to such tasks as recovering babbitt and other precious metals, removing fumes, picking up liquids from the floor or sump tanks and for final cleaning of finished products ranging from sensitive instruments to large tanks just before shipment.

With so many of these uses following a first application of vacuum the 7½-hp portable is replacing the 1½-hp unit except for smaller plants. The larger unit has been condensed so it will go through any factory door and onto any elevator.

☑ Mr. Pier

The steel industry has developed into a large and steady market for precipitation since the first blast furnace and coke oven applications in the 1920's. These two applications, in which gases are cleaned for further use, continue to be important. A large commercial installation is now dry cleaning ferromanganese blast furnace gas for its further use as well as for reducing air pollution.

Problem has been primarily one of air pollution and the industry has made great advances in combatting it with electrical precipitation. Much interest is shown in recent commercial installations for open hearths, iron ore sintering machines, iron cupolas, steel electric furnaces and scarfing machines. Extension of activities in this direction has increased greatly and shows promise.

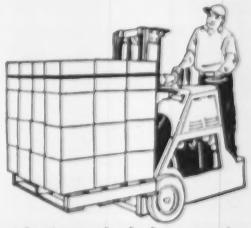
Other metallurgical applications that continue to be important include those for smelters, zinc sintering machines and, recently, cleaning of gases from aluminum reduction pots and aluminum reverberatory furnaces. Aluminum pot line appli-

As easy as falling off an unstrapped pallet

You need steel strapping on every pallet load, whether it is handled intra-plant or shipped by carrier. You need it for protection to your workers, and the prevention of loss and damage to your shipments.

And—you need SIGNODE! Through its fieldmen, Signode can show you *how to unitize the right way*, no matter what you handle or ship. The services of these men and Signode's respected packaging laboratory are yours for the asking.

Write Signode Steel Strapping Co., 2645 N. Western Ave., Chicago 47, Ill. Offices coast to coast. In Canada: Canadian Steel Strapping Co., Ltd. Foreign subsidiaries and distributors world-wide.



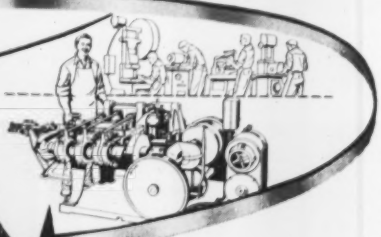
A basic method of preventing accidents to pallet loads in intra-plant handling.

Steel SIGNODE Strapping

SEND FOR FOLDER SHOWING 6 BASIC WAYS OF UNITIZING

Save Metal

Save Labor



NILSON FOUR-SLIDE

Wire and Ribbon Metal FORMING MACHINES

Mounting production costs are driving firms out of the competitive picture. Too much scrap metal! Too many single operation machines! Too many operators! This whole picture can be changed to a highly profitable operation. Install a NILSON combination press and 4-Slide forming machine. This machine takes wire or ribbon metal directly from the coil, straightens, feeds, pierces, blanks, swages, stamps, or coins, cuts off and forms . . . automatically in one quick precise operation. See the new picture? . . . Increased production! Minimum scrap metal! One machine for all operations! One operator!

For specific recommendations . . . send details of your operation.

THERE'S NOTHING LIKE A NILSON

NILSON has been specializing in Forming Equipment for over 50 years.

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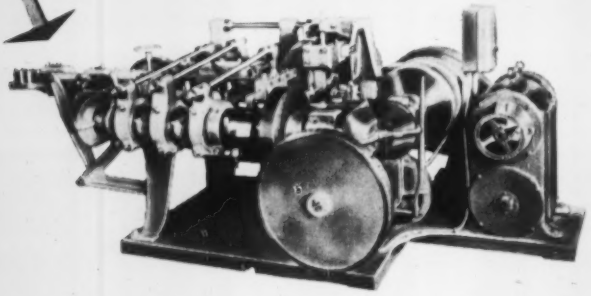


A. H. BAGENSTOSE
Eastern Regional Manager
Insul-Mastic Corp. of America, Pittsburgh

FELIX C. RODGERS
Vice President
Cardox Corp., Chicago

cation is very recent and has resulted in installation of a large number of precipitators for this purpose.

Mr. Bagenstose

Steel mill maintenance personnel have achieved considerable success in avoiding continual painting and replacing parts with heavy, mastic protective coatings. Look for greater quantities of this material to be employed in the future. Principal use for these coatings has been in coke by-products areas. However, blast furnace areas, pickling rooms and many other steel mill departments can be expected to adopt this type of corrosion prevention.

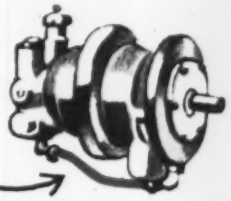
In coke oven areas, thin coatings have not given adequate protection to pipes, tanks and structural steel. Here, impure waste water, diverted to coke quenching to avoid stream pollution, cascades over burning coke and rises as steam to form a corrosive atmosphere. Result: In a few months, thin coating can be picked from a metal surface with bare fingers.

Mr. Rodgers

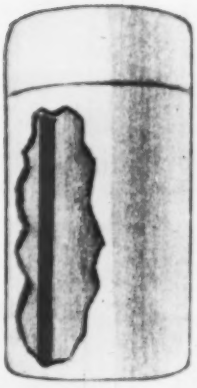
Some fires small in area—never a threat to the entire plant and scarce-

FROM the Bundy Sketchbook
TO jog a designer's imagination

HIGH PRESSURE OIL PUMP LINES

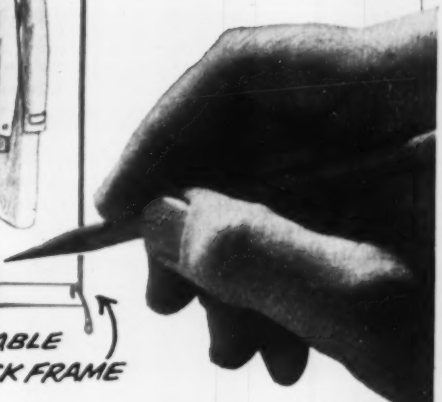


FLINT HOLDER FOR CIGARETTE LIGHTER



THERMOSTAT FOR DEEP FAT FRYER

ADJUSTABLE CLOTHES RACK FRAME



REMARKS Baffled by a brand-new tubing headache? It may be old stuff to us. Our engineers have licked hundreds of tubing problems; may help lick yours. Why not let us put Bundyweld, plus our specialized engineering skills and unmatched fabrication facilities to work on your problem.

WRITE to us for catalog or for specific information on your problem.

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DETROIT 14, MICH.

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Bundyweld starts as a single strip of copper-coated steel. Then it's . . .

continuously rolled twice around laterally into a tube of uniform thickness,

and passed through a furnace. Copper coating fuses with steel. Result . . .

Bundyweld, double-walled and brazed through 360° of wall contact.

BUNDYWELD TUBING®

DOUBLE-WALLED FROM A SINGLE STRIP

Leakproof	Lightweight
High thermal conductivity	Machines easily
High bursting point	Takes plastic coating
High endurance limit	Takes plating
Extra-strong	Bright and clean
Shock-resistant	No inside bead
Ductile	Uniform I.D., O.D.

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Bundyweld nickel and Monel tubing are sold by distributors of nickel and nickel alloys in principal cities.

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"of hard-to-hold" fluids . . . . .

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VALVES

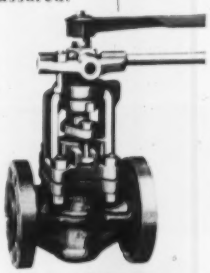
they provide sure shut-off . . .

ARE STICK PROOF . . . OPERATE INSTANTLY

A positive, drop-tight seal and instant, stick-proof operation under all fluid, temperature or pressure conditions, is assured by the exclusive, built-in, Homestead Lever-Seald mechanism. This powerful lever-and-screw device not only presses the valve's tapered plug firmly into its seat to form a drop-tight seal, but also provides a positive means of relieving seating pressure just enough to overcome friction and permit easy operation. And because all operating parts and valve seating surfaces are fully protected in both the open and closed positions from the corrosive or erosive effects of line fluids, long, dependable, trouble-free service is doubly assured.

If "hard-to-handle" fluids are your problem, specify Homestead Lever-Seald Valves for your next installation or as replacements. You'll be glad you did.

We make them in metals and alloys to specification in sizes 1½" to 12", for pressures from vacuum to 1500 lbs., and for temperatures from 40° below zero to 1100°F. Dry seat, or pressure gun lubricated optional.



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President
Rust-Oleum Corp., Evanston, Ill.

ly any risk to human life—can cut production in half or stop it completely. Protection against one type of fire may prove little or no protection against others. It is vital that management should know this and remember it.

Because all fires and hazards are not alike, it follows that they require different approaches for adequate fire protection and positive fire extinguishment. Engineered fire protection to meet needs of the specific hazard is the safest answer. Application of specialized fire protection equipment and methods has saved industry uncountable losses in dollars and production.

Results of failure are significant: 43 per cent of all concerns never get back into operation after a fire; 28 per cent go out of business within three years—or a total of 71 per cent close their doors forever following one bad fire.

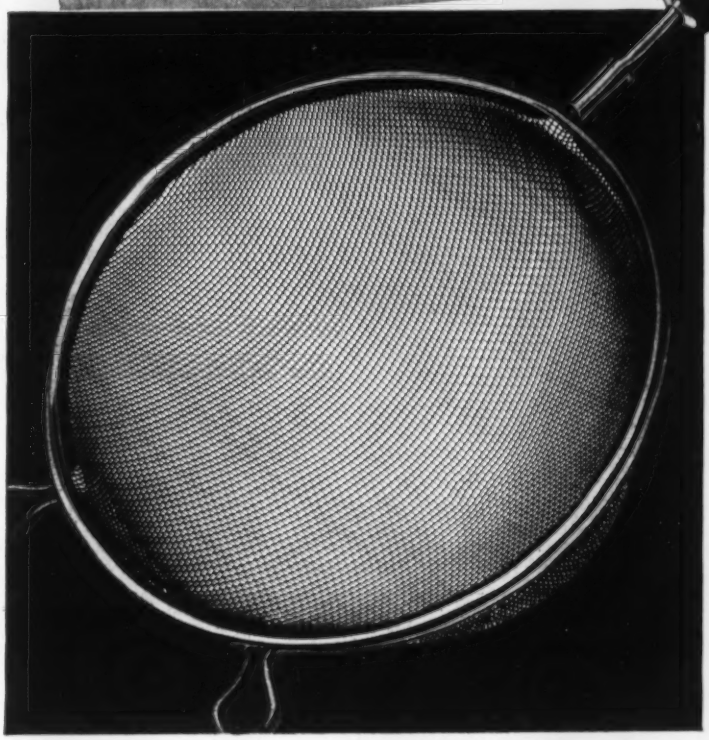
Mr. Fergusson

Reasonable manpower available for more consistent and thorough maintenance should assure use of all available types of protection against corrosion and deterioration in larger quantities than ever. Defered maintenance, due to high production activity and costly manpower in recent years, will be added to the normal demands.

Technologically speaking, the science of corrosion prevention has made rapid strides in the past 10 to 15 years. It is our experience that many companies, especially of medium size, have not yet availed themselves of present methods and devices that could substantially reduce their over-all actual losses from corrosion. Result is also failure to provide economical ways to carry out this preservation in the future.

TINNED--
FOR PROTECTION

...in preparing and processing foods...beverages... and petroleum products



Why are kitchen strainers, tea strainers, flour sifters, french fryers, automatic dish washer baskets and many other kitchen tools made of Reynolds *tinned* wire cloth?

Because tinning means resistance to rust and tarnish resulting from contact with milk, water and atmospheric gases.

Tinned wire cloth is also resistant to phosphoric acid, ammonia, carbon tetrachloride, etc.; and substances present in motor fuels and other petroleum products.

And, wherever high speed soldering is a factor—as in electrical products—Reynolds tinned wire cloth is a natural.

Whether your products are used in the kitchen, dairy, food processing and preservation, or the beverage, petroleum, or electrical industries—you'll be interested in Reynolds Wire Cloth. And, tinning is only *one* of the many special-needs demands that *Reynolds* Wire Cloth is or can be made to meet. Consult Reynolds engineers. No obligation.

Reynolds WIRE CLOTH
protects performance

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"I didn't know it was Integral"

"I didn't expect the fins to be part of the tube."

"Well, if you had to list the advantages of Wolverine Trufin*—you'd find that the integral feature would top the list.

"Because Trufin is integral, the fins are actually part of the tube. They're extruded—literally squeezed—right out of the wall of the tube. That means they'll stand up under vibration and the shock of sudden temperature changes—that there's maximum heat transfer and that Trufin can be bent, coiled and otherwise fabricated just like plain tube."

"Is that all? Are there other advantages?"

"Definitely! Trufin lets you design a much more compact heat exchanger . . . one that will provide more BTU's per foot of tubing. That means it does a better job at a lower cost. Too, Trufin is available not only in copper and copper-base alloys, but in aluminum, bi-metal, electric-welded steel and other metals."

It makes sense: If a smaller heat exchanger with a bigger punch is needed, the answer is Wolverine Trufin. It's tops in efficiency, lower in cost. Write for the Trufin data sheet today. It tells you all about sizes, fin spacings and fin heights—*everything* you need to know about Trufin.

Wolverine Trufin* and the Wolverine Spun End Process† available in Canada through the Unifin Tube Co., London, Ontario.

*REG. U.S. PAT. OFF. †A PATENTED PROCESS RE. 22465

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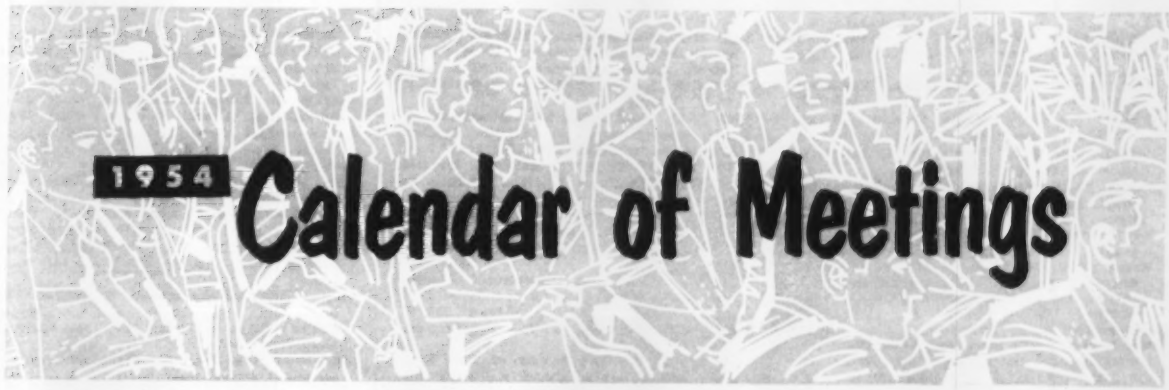

1954 Calendar of Meetings

January 5-7, American Road Builders' Association: Annual meeting, Chalfonte-Haddon Hall, Atlantic City, N. J. Association address: World Center Bldg., Washington 6. Secretary: Lt. Gen. Eugene Reybold.

January 11-13, Truck-Trailer Manufacturers Association Inc.: Annual meeting, Boca Raton hotel and club, Boca Raton, Fla. Association address: 1024 National Press Bldg., Washington 4. Managing director: John B. Hulse.

January 11-15, Society of Automotive Engineers Inc: Annual meeting and engineering display, Hotels Sheraton-Cadillac and Statler, Detroit. Society address: 29 W. 39th St., New York 18. Secretary: John A. C. Warner.

January 11-16, Association of Steel Distributors: Annual meeting, Lord Tarleton hotel, Miami Beach, Fla. Association address: 29 Broadway, New York. General counsel: Morris Rosoff.

January 12-14, National Constructors Association: Annual meeting, Hotel Commodore, New York. Association address: 50 E. 41st St., New York. Secretary: C. B. Bronson.

January 13, American Boiler Manufacturers Association & Affiliated Industries: Winter meeting, Hotel Cleveland, Cleveland. Association address: 1571 W. 117th St., Cleveland 7. Secretary: A. C. Baker.

January 14-16, National Tool & Die Manufacturers Association: Board of Trustees and committee meeting, Hotel di Lido, Miami Beach, Fla. Association address: 907 Public Square Bldg., Cleveland 13. Executive secretary: George S. Eaton.

January 15-16, Machinery & Allied Products Institute: Second session, seventh conference on capital goods economics, Edgewater Beach hotel, Chicago. Information: Secretary, Charles W. Stewart, 1200 18th St. NW, Washington 6.

January 17-19, Institute of Scrap Iron & Steel Inc.: Annual convention and exhibit, Hotel Statler, Washington. Institute address: 1729 H St. NW, Washington 6. Executive vice president: Edwin C. Barringer.

January 18-22, American Institute of Electrical Engineers: Winter general meeting, Statler hotel, New York. Institute address: 33 W. 39th St., New York 18. Secretary: H. H. Henline.

January 19-21, Caster & Floor Truck Manufacturers Association: Winter meeting, Hotel New Weston, New York. Association address: 27 E. Monroe, Chicago 3. Executive secretary: H. P. Dolan.

January 20, American Society of Body Engineers: Annual meeting, Detroit. Society address: 100 Farnsworth Ave., Detroit 2. Secretary: Edmund Wachnicki.

January 20-21, Steel Shipping Container Institute Inc.: Winter meeting, Hampshire House and Hotel Pierre, New York. Institute address: 600 Fifth Ave., New York 20. Secretary: L. B. Miller.

January 21, American Coke & Coal Chemicals Institute: Western regional meeting, Drake hotel, Chicago. Institute address: 711 14th St. NW, Washington 5. President: Samuel Weiss.

January 21-22, Steel Plate Fabricators Association: Annual meeting, Palmer House, Chicago. Association address: 37 W. Van Buren St., Chicago 5. Secretary: J. Dwight Evans.

January 21-22, National Industrial Conference Board Inc.: General session for all associates, Hotel Astor, New York. Board address: 247 Park Ave., New York 17. Secretary: Herbert S. Briggs.

January 22, Malleable Founders' Society: Semi-annual meeting, Hotel Cleveland, Cleveland. Society address: 1800 Union Commerce Bldg., Cleveland 14. Managing director: Lowell D. Ryan.

January 25-26, Industrial Furnace Manufacturers Association Inc.: Annual meeting, Warwick hotel, Philadelphia. Association address: 412 Fifth St. NW, Washington. Secretary: T. F. Sheckels.

January 25-28, Plant Maintenance & Engineering Conference and Show: Hotel Conrad Hilton and International Amphitheatre, Chicago. Information: Clapp & Poliak Inc., 341 Madison Ave., New York 17.

January 26, Cutting Tool Manufacturers Association: Annual meeting, Lochmoor Club, Detroit. Association address: 416 Penobscot Bldg., Detroit 26. Executive secretary: Martin J. Ewald.

January 26, Mining & Metallurgical Society of America: Annual meeting, Mining Club, New York. Society address: 11 Broadway, New York 4. Secretary: Lt. Col. Donald M. Liddell.

January 27-29, American Management Association: Marketing conference, Hotel Roosevelt, New York. Association address: 330 W. 42nd St., New York 36. Vice president-secretary: James O. Rice.

January 31-February 2, Hydraulic Institute: Annual meeting, Edgewater Beach hotel, Edgewater Beach, Fla. Institute address: 122 E. 42nd St., New York. Secretary: Frank P. Anderson.

January 31-February 4, Associated Equipment Distributors: Annual meeting, Hotel Waldorf-Astoria, New York. Association address: 30 E. Cedar St., Chicago. Secretary: P. D. Hermann.

February 1-5, American Society for Testing Materials: Spring meeting, Hotel Shoreham, Washington. Society address: 1916 Race St., Philadelphia 3. Executive secretary: Robert J. Painter.

February 3-5, Society of the Plastics Industry Inc.: Annual reinforced plastics division conference, Edgewater Beach hotel, Chicago. Society address: 67 W. 44th St., New York 36. Executive vice president: William T. Cruse.

February 4, Instrument Society of America: Annual regional conference, Hotel Statler, New York. Society address: 1319 Allegheny Ave., Pittsburgh 33. Secretary: P. V. Jones Jr.

February 13-18, Automotive Electric Association: Annual meeting, Edgewater Beach hotel, Chicago. Association address: 802 Michigan Bldg., Detroit. Executive secretary: S. W. Potter.

February 15, American Society of Civil Engineers: Winter meeting, Hotel Biltmore, Atlanta. Society address: 33 W. 39th St., New York. Executive secretary: Col. William N. Carey.

February 15-17, Association of Iron & Steel Engineers: West Coast meeting, Hotel Statler, Los Angeles. Association address: 1010 Empire Bldg., Pittsburgh 22. Managing director: T. J. Ess.

February 15-17, National Welding Society Association: Annual meeting, Fairmont hotel, San Francisco. Association address: 1900 Arch St., Philadelphia 3. Secretary: Robert C. Fernley.

February 15-17, American Management Association: Personnel conference, Palmer House, Chicago. Association address: 330 W. 42nd St., New York 36. Vice president-secretary: James O. Rice.

February 15-18, American Institute of Mining & Metallurgical Engineers: Annual meeting, Hotels Statler and McAlpin, New York. Institute address: 29 W. 39th St., New York. Secretary: E. H. Robie.

February 19-20, Machinery & Allied Products Institute: Third session, seventh conference on capital goods economics, Statler hotel, Washington. Information: Secretary, Charles W. Stewart, 1200 18th St. NW, Washington 6.

March 2-4, American Machine Tool Distributors Association: Spring meeting, Boca Raton hotel and club, Boca Raton, Fla. Association address: 1900 Arch St., Philadelphia 3. Executive secretary: Thomas A. Fernley Jr.

March 3, Steel Kitchen Cabinet Manufacturers Association: Spring meeting, New York. Association address: Engineers Bldg., Cleveland 14. Executive secretary: Arthur J. Tuscany Jr.

March 4-5, American Society for Metals: Spring meeting, Hotel Statler, Boston. Society address: 7301 Euclid Ave., Cleveland. Secretary: W. H. Eisenman.

March 8-12, National Electrical Manufacturers Association: Mid-winter meeting, Edgewater Beach hotel, Chicago. Association address: 155 E. 44th St., New York 17. Managing dierector: W. J. Donald.

March 9-12, American Management Association: General management conference, Fairmont hotel, San Francisco. Association address: 330 W. 42nd St., New York 36. Vice president-secretary: James O. Rice.

March 10-12, American Society of Mechanical Engineers: International meeting, Mexico City, D. F. Society address: 29 W. 39th St., New York. Secretary: C. E. Davies.

March 10-12, Society of the Plastics Industry Inc.: Pacific coast section conference, Hotel Del Coronado, Coronado, Calif. Society address: 67 W. 44th St., New York 36. Executive vice president: William T. Cruse.

March 15-17, National Association of Waste Material Dealers Inc: Annual meeting, Hotel Waldorf-Astoria, New York. Association address: 271 Madison Ave., New York 16. Managing director: Clinton M. White.

March 15-19, National Association of Corrosion Engineers: Annual conference and exhibit, Municipal Auditorium, Kansas City, Mo. Association address: 1061 M & M Bldg., Houston 2. Executive secretary: A. B. Campbell.

March 16-17, Steel Founders' Society of America: Annual meeting, Edgewater Beach hotel, Chicago. Society address: 920 Midland Bldg., Cleveland 15. Executive vice president: F. Kermit Donaldson.

March 17-19, Pressed Metal Institute: Spring technical meeting and exhibit, Hotel Carter, Cleveland. Institute address: 2860 E. 130th St., Cleveland. Managing director: O. B. Werntz.

March 19-20, Machinery & Allied Products Institute: Fourth session, seventh conference on capital goods economics, Greenbrier hotel,

White Sulphur Springs, W. Va. Information: Secretary, Charles W. Stewart, 1200 18th St. NW, Washington 6.

March 21-24, Copper and Brass Warehouse Association Inc.: Third annual meeting, Hotel Greenbrier, White Sulphur Springs, W. Va. Association address: 1420 New York Ave. NW, Washington 5. Executive secretary: George W. Proffitt.

March 23-25, Steel Shipping Container Institute Inc.: Annual meeting, Biltmore hotel, Palm Beach, Fla. Institute address: 600 Fifth Ave., New York 20. Secretary: L. B. Miller.

March 23-26, National Association of Power Engineers Inc.: Annual spring meeting and exhibit, Sherman hotel, Chicago. Association address: 176 W. Adams St., Chicago 3. Secretary: A. F. Thompson.

March 24-26, Rail Steel Bar Association: Annual meeting, Hotel Jung, New Orleans. Association address: 38 S. Dearborn St., Chicago. Secretary: W. H. Jacobs.

March 24-April 1, American Chemical Society: Spring meeting, Kansas City, Mo. Society address: 1155-16th St. NW, Washington 6. Executive secretary: Alden H. Emery.

March 25, National Industrial Conference Board Inc.: General session for all associates, Ambassador hotel, Los Angeles. Board address: 247 Park Ave., New York 17. Secretary: Herbert S. Briggs.

March 31-April 1, American Society of Mechanical Engineers: Management conference, Philadelphia. Society address: 29 W. 39th St., New York. Secretary: C. E. Davies.

April 3-4, Packaging Machinery Manufacturers Institute: Spring meeting, Hotel Dennis, Atlantic City, N. J. Institute address: 342 Madison Ave., New York. Secretary: Helen L. Stratton.

April 5-6, Society of the Plastics Industry (Canada) Inc.: Annual conference, Mt. Royal hotel, Montreal, Canada. Society address: 67 W. 44th St., New York 36. Executive vice president: William T. Cruse.

April 5-7, American Society of Lubrication Engineers: Annual meeting and exhibit, Hotel Netherland Plaza, Cincinnati. Society address: 84 E. Randolph St., Chicago 1. Secretary: W. P. Younglaus Jr.

April 5-7, Metal Treating Institute: Spring meeting, The Homestead, Hot Springs, Va. Institute address: 271 North Ave., New Rochelle, N. Y. Executive secretary: C. E. Herington.

April 5-7, American Institute of Mining & Metallurgical Engineers: National open hearth conference, Palmer House, Chicago. Institute address: 29 W. 39th St., New York. Secretary: E. H. Robie.

April 5-7, National Fluid Power Association: Spring meeting, Edgewater Gulf hotel, Edgewater Park, Miss. Association address: 1618 Orrington Ave., Evanston, Ill. Executive secretary: Barrett Rogers.

April 5-8, American Management Association: National packaging exposition and conference, Auditorium, Atlantic City, N. J. Association address: 330 W. 42nd St., New York 36. Vice president-secretary: James O. Rice.

April 6-7, Machine Tool Electrification Forum: Westinghouse Electric Corp., sponsor; Hotel Statler and Westinghouse works, Buffalo. Information: A. G. Muller, Westinghouse, East Pittsburgh plant.

April 7-9, International Acetylene Association: Spring meeting, Palmer House, Chicago. Association address: 30 E. 42nd St., New York 17. Secretary: H. F. Reinhard.

April 11-15, American Hardware Manufacturers Association: Spring meeting, Roosevelt hotel, New Orleans. Association address: 342 Madison Ave., New York 17. Secretary: Arthur L. Faubel.

April 13-14, Industrial Truck Association: Spring meeting, Drake Hotel, Chicago. Association address: Washington Loan & Trust Bldg., Washington 4. Secretary: William Van C. Brandt.

April 14-16, Society for Experimental Stress Analysis: Spring meeting and exhibit, Hotel Netherland Plaza, Cincinnati. Society address: P. O. Box 168, Cambridge 39, Mass. Secretary: W. M. Murray.

April 18-23, American Ceramic Society Inc: Annual meeting, Palmer House, Chicago. Society address: 2525 N. High St., Columbus 2, Ohio. Secretary: Charles S. Pearce.

April 20-21, American Zinc Institute Inc.: Annual meeting, Hotel Statler, St. Louis. Institute address: 60 E. 42nd St., New York 17. Secretary: E. V. Gent.

April 21-23, National Screw Machine Products Association: Annual meeting, Hotel Statler, Detroit. Association address: 2860 E. 130th St., Cleveland 20. Executive secretary: Orrin B. Werntz.

April 22-23, Lead Industries Association: Annual closed meeting, Drake hotel, Chicago. Association address: 420 Lexington Ave., New York 17. Secretary: Robert L. Ziegfeld.

April 23-24, Machinery & Allied Products Institute: Fifth session, seventh conference on capital goods economics, The Homestead, Hot Springs, Va. Information: Secretary, Charles W. Stewart, 1200 18th St. NW, Washington 6.

April 26-28, American Management Association: Manufacturing conference, Hotel Statler, Cleveland. Association address: 330 W. 42nd St., New York 36. Vice president-secretary: James O. Rice.

April 26-30, American Society of Tool Engineers: Convention and industrial exposition, Bellvue-Stratford and Convention Hall and Commercial Museum, Philadelphia. Society address: 10700 Puritan Ave., Detroit 21. Executive secretary: H. E. Conrad.

April 26-28, Metal Powder Association: Annual open meeting and exhibit, Drake hotel, Chicago. Association address: 420 Lexington Ave., New York 17. Secretary: Robert L. Ziegfeld.

April 29-30, Radio-Electronics-Television Manufacturers Association: Joint conference (U.S.-Canadian board meetings), General Brock hotel, Niagara Falls, Canada. Association address: 777 14th St. NW, Washington 5. Secretary: James D. Secrest.

May 2-4, American Steel Warehouse Association: Annual meeting, Hotel Drake, Chicago. Association address: 442 Terminal Tower, Cleveland 13. President: Walter S. Doxsey.

May 2-4, National Tool & Die Manufacturers Association: Board of trustees and committee meeting, Hotel Statler, Washington. Association address: 907 Public Square Bldg., Cleveland 13. Executive secretary: George S. Eaton.

May 2-6, Electrochemical Society Inc.: Annual spring meeting, LaSalle hotel, Chicago. Society address: 216 W. 102nd St., New York 25. Secretary: Dr. Henry B. Linford.

May 2-7, Scientific Apparatus Makers Association: Annual meeting, Broadmoor hotel, Colorado Springs, Colo. Association address: 20 N. Wacker Dr., Chicago. Executive vice president: Kenneth Andersen.

May 3-5, Association of Iron & Steel Engineers: Spring meeting, Bellvue-Stratford hotel, Philadelphia. Association address: 1010 Empire Bldg., Pittsburgh 22. Managing director: T. J. Ess.

May 3-5, American Mining Congress: Coal convention, Hotel Netherland Plaza, Cincinnati. Congress address: 1102 Ring Bldg., Washington 6. Executive vice president: Julian D. Conover.

May 3-8, Concrete Reinforcing Steel Institute: Annual meeting, Boca Raton hotel and club, Boca Raton, Fla. Institute address: 38 S. Dearborn St., Chicago 3. Management director: H. C. Delzell.

May 4-6, Electronic Components Symposium: Auditorium, U. S. Department of Interior, Washington. Information: Radio-Electronics-Television Manufacturers Association, 777 14th St. NW, Washington 5.

May 4-8, American Welding Society: National spring technical meeting and welding & allied industry exposition, Hotel Statler and Memorial Auditorium, Buffalo. Society address: 33 W. 39th St., New York 18. Secretary: J. G. Magrath.

May 8-14, American Foundrymen's Society: Annual convention and biennial exposition, Public Auditorium, Cleveland. Society address: 616 S. Michigan Ave., Chicago 5. Secretary-treasurer: W. W. Maloney.

May 9-12, Liquefied Petroleum Gas Association Inc: Annual meeting and exhibit, Hotel Conrad Hilton, Chicago. Association address: 11 S. LaSalle St., Chicago 3. Secretary: Arthur C. Kreutzer.

May 12-14, Porcelain Enamel Institute Inc.: Midyear divisional meeting, Edgewater Beach hotel, Chicago. Institute address: DuPont Circle Bldg., Washington 6. Secretary: John C. Oliver.

May 16-17, Industrial Furnace Manufacturers Association Inc.: Spring meeting, The Homestead, Hot Springs, Va. Association address: 412 Fifth St. NW, Washington. Secretary: T. F. Sheckels.

May 16-19, American Institute of Chemical Engineers: Meeting, Hotel Kimball, Springfield, Mass. Institute address: 120 E. 41st St., New York 17. Secretary: Stephen L. Tyler.

May 17-19, National Industrial Distributors Association: Annual meeting, Hotel Waldorf-Astoria, New York. Association address: 1900 Arch St., Philadelphia 3. Secretary: H. R. Rinehart.

May 17-19, American Supply & Machinery Manufacturers Association: Triple industrial supply convention and conference booth program, Hotel Waldorf-Astoria, New York. Association address: 814 Clark Bldg., Pittsburgh. General manager: R. Kennedy Hanson.

May 17-20, Basic Materials Exposition: International Amphitheatre, Chicago. Information: Clapp & Poliak Inc., 341 Madison Ave., New York 17.

May 19-21, Gas Appliance Manufacturers Association: Annual meeting, Drake hotel, Chicago. Association address: 60 E. 42nd St., New York 17. Managing director: H. Leigh Whitelaw.

May 20-21, National Industrial Conference Board Inc.: General session for all associates and annual meeting of board members, Hotel Waldorf-Astoria, New York. Board address: 247 Park Ave., New York 17. Secretary: Herbert S. Briggs.

May 23-26, Copper & Brass Research Association: Annual spring meeting, The Homestead, Hot Springs, Va. Association address: 420 Lexington Ave., New York 17 Secretary: B. B. Caddle.

May 23-26, National Association of Purchasing Agents: Annual meeting and exhibit, Hotel Conrad Hilton, Chicago. Association address: 11 Park Place, New York. Secretary: G. A. Renard.

May 25-28, Industrial Diamond Association of America Inc.: Annual meeting, Hotel Claridge, Atlantic City, N. J. Association address: 124 E. 40th St., New York. Executive manager: Athos D. Leveridge.

May 26-27, American Iron & Steel Institute: Annual meeting, Hotel Waldorf-Astoria, New York. Institute address: 350 Fifth Ave., New York 1. Secretary: George S. Rose.

May 27-29, Steel Kitchen Cabinet Manufacturers Association: Annual meeting, The Greenbrier, White Sulphur Springs, W. Va. Association address: Engineers Bldg., Cleveland 14. Executive secretary: Arthur J. Tuscany Jr.

May 31-June 11, Canadian International Trade Fair & National Air Show: Exhibition Park, Toronto, Canada.

June 6-9, American Gear Manufacturers Association: Annual meeting, The Homestead, Hot Springs, Va. Association address: 302 Empire Bldg., Pittsburgh 22. Executive secretary: J. C. Sears.

June 7-10, Society of the Plastics Industry Inc.: National plastics exposition, Public Auditorium, Cleveland. Society address: 67 W. 44th St., New York 36. Executive vice president: William T. Cruse.

June 9-11, American Society for Quality Control: Annual convention and exhibit, Hotel Jefferson, St. Louis. Convention manager: Wade R. Weaver, Republic Steel Corp., Republic Bldg., Cleveland.

June 10-11, Magnesium Association: Mid-year meeting, Seigniory club, Montibello, Quebec, Canada. Association address: 122 E. 42nd St., New York. Assistant secretary: Martha I. Hansen.

June 13-16, American Boiler Manufacturers Association & Affiliated Industries: Annual meeting, The Homestead, Hot Springs, Va. Association address: 1571 W. 117th St., Cleveland 7. Secretary: A. C. Baker.

June 13-17, National Industrial Service Association Inc.: Annual meeting, Hotel Statler, Detroit. Association address: 818 Olive St., St. Louis. Information: Horace Barks.

June 13-18, American Society for Testing Materials: Annual meeting and exhibit, Hotels Sherman and Morrison, Chicago. Society address: 1916 Race St., Philadelphia 3. Executive secretary: Robert J. Painter.

June 14-15, Malleable Founders' Society: Annual meeting, Seigniory club, Montibello, Quebec. Society address: 1800 Union Commerce Bldg., Cleveland 14. Managing director: Lowell D. Ryan.

June 14-19, American Society of Civil Engineers: Spring meeting, Chalfonte-Haddon Hall, Atlantic City, N. J. Society address: 33 W. 39th St., New York. Executive secretary: Col. William N. Carey.

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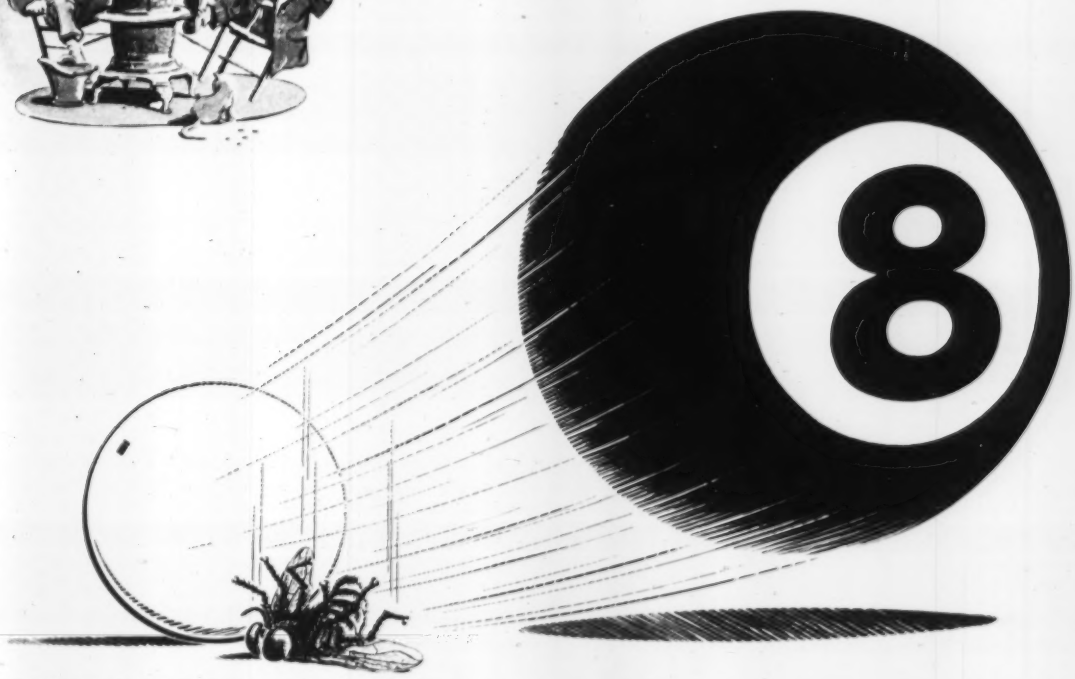

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"Time stood still as the boys placed their bets as to whether he would or not. And, believe it or not, the fly didn't move a hair all the while. Everybody figured my friend would try to loft the cue-ball so's it would come down exactly on top of the fly and mash him. Ain't the way my friend had it planned.

"When they all got their bets made, my friend chalked up his cue, took careful aim, and whammo! He knocked that 8-ball out from under that fly so fast, that the durn thing fell on the table and broke its back."

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June 15-17, Radio-Electronics-Television Manufacturers Association: Annual convention, Palmer House, Chicago. Association address: 777 14th St. NW, Washington 5. Secretary: James D. Secrest.

June 20-23, Aviation Distributors & Manufacturers Association: Mid-year meeting, Stanley hotel, Estes Park, Colo. Association address: 1900 Arch St., Philadelphia 3. Executive secretary: H. Donald Richards.

June 20-24, American Society of Mechanical Engineers: Semi-annual meeting, William Penn hotel, Pittsburgh. Society address: 29 W. 39th St., New York. Secretary: C. E. Davies.

June 21-23, American Management Association: General management conference, Hotel Statler, New York. Association address: 330 W. 42nd St., New York 36. Vice president-secretary: James O. Rice.

June 21-25, American Institute of Electrical Engineers: Summer general and Pacific general meeting, Hotel Biltmore, Los Angeles. Institute address: 33 W. 39th St., New York 18. Secretary: H. H. Henline.

June 27-29, Alloy Casting Institute: Annual meeting, The Homestead, Hot Springs, Va. Institute address: 32 Third Ave., Mineola, N. Y. Executive vice president: E. A. Schoefer.

July 12-15, American Electroplaters' Society: Annual convention, Hotel Statler, New York. Society address: 445 Broad St., Newark 2, N. J. Executive secretary: P. Peter Kovatis.

July 13-15, Western Plant Maintenance Show & Conference: Pan Pacific Auditorium, Los Angeles. Information: Clapp & Poliak Inc., 759 Monadnock Bldg., San Francisco 5.

July 22-23, Truck-Trailer Manufacturers Association Inc.: Summer meeting, Edgewater Beach hotel, Chicago. Association address: 1024 National Press Bldg., Washington 4. Managing director: John B. Hulse.

August 2-4, National Tool & Die Manufacturers Association: Board of trustees and committee meeting, Grand hotel, Mackinac Island, Mich. Association address: 907 Public Square Bldg., Cleveland 13. Executive secretary: George S. Eaton.

August 30-September 3, Automotive Electric Association: Annual fall meeting, Vanss Springs hotel, Vanss Springs, Alberta, Canada. Association address: 802 Michigan Bldg., Detroit. Executive secretary: S. W. Potter.

September 5-8, Pressed Metal Institute: Annual fall meeting, Manoir Richelieu hotel, Murray Bay, Quebec. Institute address: 2860 E. 130th St., Cleveland. Managing director: O. B. Werntz.

September 7-9, Industrial Truck Association: Fall meeting, Greenbrier hotel, White Sulphur Springs, W. Va. Association address: Washington Loan & Trust Bldg., Washington 4. Secretary: William Van C. Brandt.

September 8-10, American Society of Mechanical Engineers: Fall meeting, Schroeder hotel, Milwaukee, Wis. Society address: 29 W. 39th St., New York. Secretary: C. E. Davies.

September 8-10, Porcelain Enamel Institute Inc.: Shop practice forum meeting, University of Illinois, Urbana, Ill. Institute address: DuPont Circle Bldg., Washington 6. Secretary: John C. Oliver.

September 12-17, American Chemical Society: Fall meeting, New York. Society address: 1155-16th St., NW, Washington 6. Executive secretary: Alden H. Emery.

September 13-15, Allied Railway Supply Association: Annual meeting and exhibit, Hotel Sherman, Chicago. Association address: 1200 W. Chase Ave., Chicago 26. Secretary: C. F. Weil.

September 13-24, American Society of Mechanical Engineers: Joint IRD-ISA conference, Convention hall, Philadelphia. Society address: 29 W. 39th St., New York. Secretary: C. E. Davies.

September 13-24, Instrument Society of America: International instrument congress & exposition, Convention Hall and Commercial Museum, Philadelphia. Society address: 1319 Allegheny Ave., Pittsburgh. Secretary: P. V. Jones Jr.

September 15-18, National Metal Trades Association: Plant management conference, East: Sagamore hotel, Bolton Landing, Lake George, N. Y. Association address: 122 S. Michigan Ave., Chicago 3. Secretary: Charles L. Blatchford.

September 20-22, Truck Body & Equipment Association Inc.: Annual meeting and exhibit, Hotel Statler, Buffalo. Association address: 1122 Dupont Circle Bldg., Washington 6. Executive manager: Arthur H. Nuesse.

September 20-23, American Mining Congress: Mining show, Civic auditorium, San Francisco. Congress address: 1102 Ring Bldg., Washington 6. Executive vice president: Julian D. Conover.

September 21-23, Society for Experimental Stress Analysis: Fall meeting and exhibit, Hotel Bellevue-Stratford, Philadelphia. Society address: P. O. Box 168, Cambrige 39, Mass. Secretary: W. M. Murray.

September 22, Cutting Tool Manufacturers Association: Fall meeting, Lochmoor Club, Detroit. Association address: 416 Penobscot Bldg., Detroit 26. Executive secretary: Martin J. Ewald.

September 27-28, Steel Founders' Society of America: Fall meeting, The Greenbrier, White Sulphur Springs, W. Va. Society address: 920 Midland Bldg., Cleveland 15. Executive vice president: F. Kermit Donaldson.

September 27-30, Society of Industrial Packaging & Materials Handling Engineers: Annual exposition, competition and short course, Coliseum, Chicago. Society address: 20 W. Jackson Blvd., Chicago 4. Managing director: Charles J. Carney Jr.

September 28-October 1, Association of Iron & Steel Engineers: Annual convention and biennial exposition, Public auditorium, Cleveland. Association address: 1010 Empire Bldg., Pittsburgh 22. Managing director: T. J. Ess.

September 30-October 2, Porcelain Enamel Institute Inc: Annual meeting, Greenbrier hotel, White Sulphur Springs, W. Va. Institute address: DuPont Circle Bldg., Washington 6. Secretary: John C. Oliver.

October 3-6, American Hardware Manufacturers Association: Fall meeting, Marlborough Blenheim hotel, Atlantic City, N. J. Association address: 342 Madison Ave., New York 17. Secretary: Arthur L. Faubel.

October 3-7, Electrochemical Society Inc.: Fall meeting, Hotel Statler, Boston. Society address: 216 W. 102nd St., New York 25. Secretary: Dr. Henry B. Linford.

October 4-6, National Electronics Conference: Annual meeting and exhibit, Hotel Sherman, Chicago. Conference address: 84 E. Randolph St., Chicago 1. Secretary: John M. Cage.

October 6-8, National Foundry Association: Annual meeting, Hotel Sheraton, Chicago. Association address: 53 W. Jackson Blvd., Chicago. Executive secretary: Charles T. Sheehan.

October 11-14, American Gas Association: Annual meeting, Municipal Auditorium, Atlantic City, N. J. Association address: 420 Lexington Ave., New York 17. Secretary: Kurwin R. Boyes.

October 11-15, American Institute of Electrical Engineers: Fall general meeting, Morrison hotel, Chicago. Institute address: 33 W. 39th St., New York 18. Secretary: H. H. Henline.

October 12-15, American Chemical Society, Chicago Section: National chemical exposition, Coliseum, Chicago. Society address: 86 E. Randolph St., Chicago 1.

October 14-16, Foundry Equipment Manufacturers Association Inc.: Annual meeting, The Greenbrier, White Sulphur Springs, W. Va. Association address: Engineers Bldg., Cleveland 14. Executive secretary: Arthur J. Tuscany Jr.

October 16-19, Conveyor Equipment Manufacturers Association: Annual meeting, Greenbrier hotel, White Sulphur Springs, W. Va. Association address: 1 Thomas Circle, Washington 5. Executive vice president: R. C. Sollenberger.

October 19, American Society of Safety Engineers: Annual meeting, Conrad Hilton hotel, Chicago. Society address: 425 N. Michigan Ave., Chicago 11. Secretary and managing director: Jasper J. Johnson.

October 24-27, American Gear Manufacturers Association: Semi-annual meeting, Edgewater Beach hotel, Chicago. Association address: 302 Empire Bldg., Pittsburgh 22. Executive secretary: J. C. Sears.

October 25-27, Packaging Institute: Annual meeting, Hotel Roosevelt, New York. Institute address: 342 Madison Ave., New York 17. Executive director: Lawrence V. Burton.

October 25-28, American Institute of Steel Construction Inc.: Annual meeting and exhibit, The Greenbrier, White Sulphur Springs, W. Va. Institute address: 101 Park Ave., New York 17. Secretary: M. Harvey Smedley.

October 27-29, Grinding Wheel Institute and Abrasive Grain Association: Fall meeting, Edgewater Beach hotel, Chicago. Information: Hunter Thomas Associates, 2130 Keith Bldg., Cleveland 15.

October 27-30, National Association of Aluminum Distributors: Annual meeting, Boca Raton hotel and club, Boca Raton, Fla. Association address: 1900 Arch St., Philadelphia 3. Secretary: R. B. Wall.

October 28-29, American Society of Mechanical Engineers: Fuels-AIME coal conference, William Penn hotel, Pittsburgh. Society address: 29 W. 39th St., New York. Secretary: C. E. Davies.

October 29-31, Metal Treating Institute: Annual meeting, Hotel Sheraton, Chicago. Institute address: 271 North Ave., New Rochelle, N. Y. Executive secretary: C. E. Herington.

October 31-November 3, National Screw Machine Products Association: Fall membership meeting, The Homestead, Hot Springs, Va. Association address: 2860 E. 130th St., Cleveland 20. Executive secretary: Orrin B. Werntz.

November 1-5, National Metal Congress & Exposition: International Amphitheatre, Chicago. Information: W. H. Eisenman, secretary, American Society for Metals, 7301 Euclid Ave., Cleveland 3.

November 1-5, American Society for Metals: Annual meeting, Palmer House, Chicago. Society address: 7301 Euclid Ave., Cleveland. Secretary: W. H. Eisenman.

November 1-5, American Welding Society: Fall meeting, Hotel Sherman, Chicago. Society address: 33 W. 39th St., New York 18. Executive secretary: J. G. Magrath.

November 1-5, Society for Nondestructive Testing Inc.: Annual meeting, Hotel Morrison, Chicago. Society address: 1109 Hinman Ave., Evanston, Ill. National secretary: Philip D. Johnson.

November 4-7, National Tool & Die Manufacturers Association: Annual convention, Dayton Biltmore hotel, Dayton, O. Association address: 907 Public Square Bldg., Cleveland 13. Executive secretary: George S. Eaton.

November 7-10, American Institute of Wholesale Plumbing & Heating Supply Associations Inc.: Fall meeting, Hotel Roosevelt, New Orleans. Association address: 402 Albee Bldg., Washington. Executive secretary: George T. Underwood.

November 8-11, Wire Association: Annual fall meeting, Hotel Statler, Detroit. Association address: 453 Main St., Stamford, Conn. Executive secretary: Richard E. Brown.

November 8-12, National Electrical Manufacturers Association: Annual meeting, Chalfonte-Haddon Hall, Atlantic City, N. J. Association address: 155 E. 44th St., New York 17. Managing director: W. J. Donald.

November 11-12, Gray Iron Founders' Society Inc.: Annual meeting, The Homestead, Hot Springs, Va. Society address: National City-E. 6th Bldg., Cleveland. Executive vice president: Donald H. Workman.

November 15-17, American Standards Association: Fifth national standardization conference, Hotel Roosevelt, New York. Association address: 70 E. 45th St., New York. Managing director: Admiral G. F. Hussey.

November 18-19, National Constructors Association: Fall meeting, International House, New Orleans. Association address: 50 E. 41st St., New York. Secretary: C. B. Bronson.

November 28-December 3, American Society of Mechanical Engineers: Annual meeting, Statler hotel, New York. Society address: 29 W. 39th St., New York. Secretary: C. E. Davies.

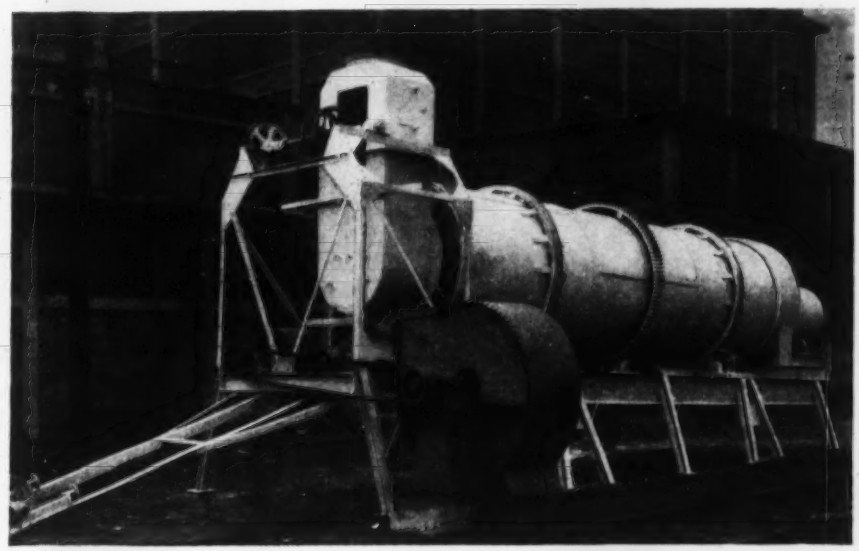
December 5-9, Scientific Apparatus Makers Association: Fall meeting, Pinehurst hotel, Pinehurst, N. C. Association address: 20 N. Wacker Dr., Chicago. Executive vice president: Kenneth Andersen.

December 12-15, American Institute of Chemical Engineers: Annual meeting, Hotel New Yorker, New York. Institute address: 120 E. 41st St., New York 17. Secretary: Stephen L. Tyler.

December 14-15, Industrial Truck Association: Winter meeting, Hotel Statler, New York. Association address: Washington Loan & Trust Bldg., Washington 4. Secretary: William Van C. Brandt.

what's your problem?

Here are **2 solutions** *we've provided for others . . .*
maybe we can help **you!**



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NEW PRODUCTS and equipment

Reply card on page 455 will bring you more information on any new products and equipment in this issue

Surface Grinder Line

. . . for work on jig plates

Line of type B hydraulic surface grinders ranges in sixteen sizes from 6 x 18 to 12 x 120 inches. Grinders are especially applicable for work on jig plates, intricate lamination dies or jet

engine parts. Design highlights include a crossfeeding wheelhead with horizontal spindle grinding with periphery of wheel; accurate work positioning, with patented antifriction elevating nut; in-position wheel truing.

Grinders have automatic lubrication and built-in coolant system. Some of their auxiliary equipment includes automatic down feed, micrometer backup stop, high-speed spindle attachment and dust collector. Thompson Grinder Co., Dept. ST, Springfield, O.

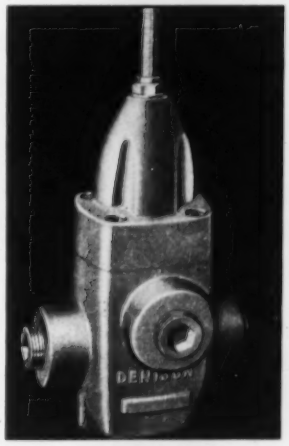
FOR MORE DATA—CIRCLE REPLY CARD NO. 1

Sequence Valve Line

. . . circuits 25 to 2000 psi

Complete line of direct-operating sequence valves is suitable for use in circuits from 25 to 2000 psi. Line provides precision control for interlocked hydraulic applications, insuring close synchronization of primary and secondary operations. Pressure setting of the valve is adjusted easily. When system pressure reaches pressure setting of the valve, latter diverts oil to the secondary circuit.

Pressure buildup brings immediate action of the pilot piston in



the secondary circuit, which can be adjusted to shift at any pressure from 25 to 2000 psi. Use of the small pilot piston eliminates need for heavy spring loading at high pressures. Dension Engineering Co., Dept. ST, Columbus, O.

FOR MORE DATA—CIRCLE REPLY CARD NO. 2

Black Plating Process

. . . all metals except aluminum

Plating process, called Electro-Black, provides fast deposition of a black plate on all metals except aluminum. On die cast metals, a thin copper or brass undercoat will suffice for Electro-Black treatment. It reflects surface underneath without additional polishing or processing. In addition, it is easily high-lited.

The process should interest both decorative and protective finishers. The company reports it has ample laboratory facilities for sample work and recommendations. Enequist Chemical Co. Inc., Dept. ST, 100 Varick Ave., Brooklyn 37, N. Y.

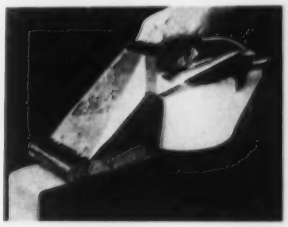
FOR MORE DATA—CIRCLE REPLY CARD NO. 3

Portable Carton Sealer

. . . goes to work anywhere

It's no longer necessary to carry heavy cartons to a stationary tape dispenser. This portable Roll-on-Sealer weighs only 2½ pounds before loading, can be taken anywhere to seal cartons. It is also handy for resealing broken cartons in a warehouse or shipping dock.

Loading is simplified by self-raising cover; closing threads tape



automatically. Design is simplified so there is nothing to get out of order—no gears, ratchets, motor or mechanism of any kind. Roll-On-Sealer Co., Dept. ST, Antioch, Ill.

FOR MORE DATA—CIRCLE REPLY CARD NO. 4

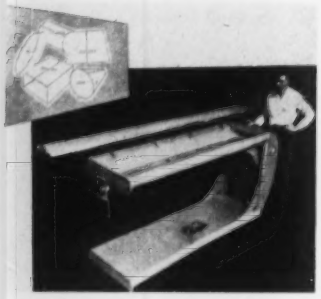
Longitudinal Welding Fixture

. . . holds and aligns any metal

This longitudinal welding fixture, with numerous individual fingers, hold and aligns any metal of almost any thickness and shape. Result is to permit mounting any of the automatic welding processes. Rotating mandrel accommodates several copper backup bars, any one of which can be

rotated into position with little effort.

Hand welding is possible, as well as automatic processes. Metal



thickness from 0.005 to 1 inch can be welded without major change. Airline Welding & Engineering, Dept. ST, 785 N. Prairie Ave., Hawthorne, Calif.

FOR MORE DATA—CIRCLE REPLY CARD NO. 5

Powdered Flux

. . . insures removal of oxides

This powdered flux is used for welding aluminum bronze sheet and plate; can be used with the inert-gas processes and bare Ampco-Trode filler rods in all grades.

Tests also indicate that the flux can be applied successfully to join other copper alloys, such as the silicon bronzes, tin bronzes and brasses.

Flux insures removal of oxides from weld metal and reduces surface tension, allowing deposit to flow into side walls uniformly. Full penetration can be secured in straight butt joints at low welding currents and preheats. Ampco Metal Inc., Dept ST, 1745 S. 38 St., Milwaukee 46, Wis.

FOR MORE DATA—CIRCLE REPLY CARD NO. 6

Box Stitching Line

. . . available in five types

Box stitcher, model N-5, is available in five different types: Post, arm, combination, side seam and top. With this line, all types of corrugated and solid fiber boxes can be stitched quickly and securely, at minimum cost. Hand lever makes machine immediately adjustable to handle work 1/16 to ¾-inch thick.

Mechanism is simple and read-

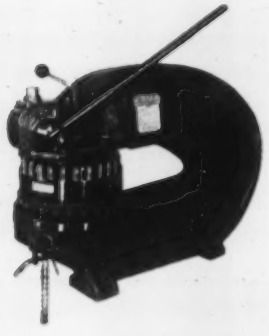
ily accessible for maintenance. Formers, flat knife and drivers are reversible for longer life. Wire tangling is eliminated by built-in brake mechanism. Acme Steel Co., Dept. ST, 2840 Archer Ave., Chicago, Ill.

FOR MORE DATA—CIRCLE REPLY CARD NO. 7

Quick-Change Punch Press

. . . 18-station rotary turret

This 18-station rotary punch press punches any shape hole. Desired punch-and-die set is brought



instantly into position by rapid, manual turn of turret and locks into place with perfect alignment.

Punch-and-die sets can be made to designs or are available in scores of round or irregular shapes and sizes up to 2 inches in diameter. Rotex Punch Co. Inc. Dept. ST, 2350 Alvarado, San Leandro, Calif.

FOR MORE DATA—CIRCLE REPLY CARD NO. 8

Waterproof Enamel

. . . flows on like rubber

All-weather protection for concrete and masonry surfaces results from this waterproof enamel. Stone-Dri, made with a 100 per cent plastic rubber base. The coating's resistant formulation enables it to stand up under chemical action of lime and alkali found in cement, stucco and masonry.

Easy to apply, it flows on like liquid rubber, displaying qualities of elasticity and toughness. The coating is available in four colors.

Sapolin Paints Inc., Dept. ST, 229 E. 42nd St., New York City 17, N. Y.

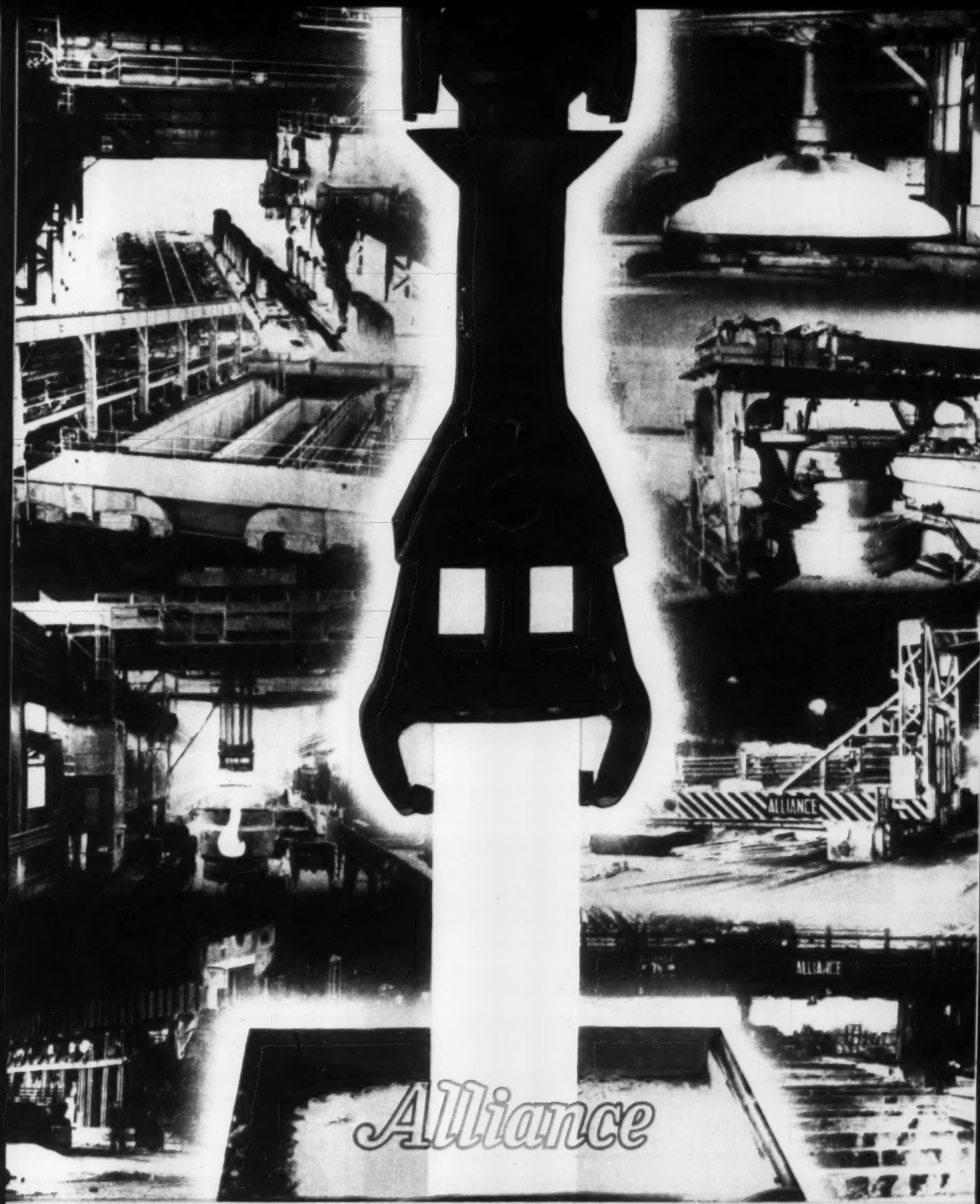
FOR MORE DATA—CIRCLE REPLY CARD NO. 9

Industrial Washing Machine

. . . loaded at normal work level

Industrial washing machine boasts innovations to make cleaning of a wide variety of miscellaneous parts quick and easy. Machine agitates a tray holding parts through cleaning bath, generally a solvent-type material. One advantage: Machine is loaded at normal work level. Operator need not raise or lower parts to be cleaned and need not get his hands near the solution.

Tanks can be operated cold or heated with steam, gas, oil or electricity. Control holds temperature at any point between 80 and 212 F. Tank lid is hinged and has



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NEW PRODUCTS and equipment

160°F fusible link for automatic closing in case of fire. Cincinnati Cleaning & Finishing Machinery Co., Dept. ST, Sharonville, O.

FOR MORE DATA—CIRCLE REPLY CARD NO. 10

Air-Hydraulic Vises

. . . setup time is negligible

Line of power-operated vises has conventional vise screw and handle for presetting jaw opening to size of workpiece. Power unit, which is attached to conventional vise, has adjustable power stroke from 0 to ¾-inch. Maximum jaw

opening varies from 3 to 9 inches, depending on vise size. Power stroke is activated by foot or hand control.

Setup time between jobs is negligible. Wilton Tool Mfg. Co., Dept. ST, 925-941 Wrightwood Ave., Chicago 14, Ill.

FOR MORE DATA—CIRCLE REPLY CARD NO. 11

Gasoline Engine Truck

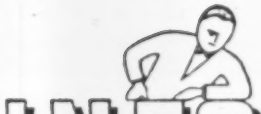
. . . for rough-surface work

Gasoline-engine 4000-pound fork truck designed for outside or rough-surface work features 14-mph traveling speed. This high

(Continued on p. 458)

USE A REPLY CARD

Just circle the corresponding number of any item in this section for more information.



INFORMATION

AVAILABLE FOR THE ASKING

62. Level & Flow Indicator

Fenwal Inc. — 16-page illustrated booklet contains applications, installation tips and circuit suggestions for Detect-A-Flo unit that controls or detects both liquid level and air flow. Operating principle is described, and detailed specifications including response curves are shown.

63. Manganese Steel Castings

American Brake Shoe Co., American Manganese Steel Div.—Complete line of castings made of the "toughest steel known" is described in this general catalog on manganese steel castings. Typical castings are shown in over 100 photos with applications listed. Characteristics are discussed.

64. DC Indicating Instruments

General Electric Co.—Portable direct current indicating instruments are subject of 8-page illustrated bulletin GEC-979A. Designed for various applications, the type DP-11 and DP-12 instruments have their specifications, features and performance data given.

65. Nickel Chrome Castings

Standard Alloy Co.— Engineering data on HR-3 cast alloy is found in 4-page bulletin No. 1. Containing 37 per cent nickel and 17 per cent chromium, alloy is for parts subject to corrosive elements and high temperatures. Physical, chemical and mechanical properties are given.

66. Iron Powder Parts

Pow-Met Industries Inc.—Wide range of physical properties available in iron powder parts is related in 4-page illustrated folder. High density parts are said to have physical properties equal to or exceeding those of steel parts. Process and general specifications are given.

67. Rebuilt Machine Tools

Simmons Machine Tool Corp.—1953-54 issue of "The Simmons Way" offers numerous article and case histories of new and rebuilt machine tools. Included in this 8-page piece is the story about contract machining facilities used for precise machining operations on large unwieldy parts; how a huge vertical boring mill and 30-year old lathe were modernized; and the rebuilding process of a Bullard vertical turret lathe.

68. Unified Thread Manual

Besly-Welles Corp.—Practical explanation of new British-American unified thread standards is included in tap reference booklet. Data are also presented on tap-drill sizes, tap selection, feeds, speeds, sharpening procedures and coolants.

69. Lubrication Manual

D. A. Stuart Oil Co.—"Shop Notebook" is a 60-page manual on machine tool lubrication practices. Both lubricants and cutting fluids are considered in relation to different machines and materials. Recommendations are made, and a great deal of useful general data are also presented.

70. Coolant Filters

Industrial Filtration Co.—Technical information on Delpark coolant filters for Besly grinding machines is found in 4-page illustrated bulletin. Optional filters are full-flow, self-cleaning, continuous and fully automatic in operation.

71. Broaching Troubles

National Broach & Machine Co.—Wall chart lists broach trouble-shooting and gear shaving check points. Broaching troubles are listed under broach, part, machine and coolant. Fourteen gear shaving trouble sources are named.

72. Lift Truck

Hyster Co.—Model YT-40 4000-lb capacity lift truck is described and illustrated in form 1284. Unit has trunnion-mounted steering, pneumatic tires and is a general purpose inside-outside truck. Bulletin gives description, illustrations and all specs.

1-4-54

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73. Roughness Measurement

Micrometrical Mfg. Co.—8-page illustrated bulletin describes the Wavometer, a shop instrument for measuring average microinch height of waviness irregularities around symmetrical surfaces of rotation such as bearing races. Operation of machine is fully described, specs are given and how to specify standards on drawings and shop prints is shown. Readings are indicated both visibly and audibly.

74. Aluminum Mill Products

Reynolds Metals Co.—12 pages of the "1954 Aluminum Mill Products Design" brochure present condensed technical information on Reynolds mill products. Data on characteristics of aluminum, standard alloys, tempers and sizes of sheet, plate, wire, rod, bar, tubing, pipe, extruded and architectural shapes are given. Selection guide is included for both wrought and cast alloys.

75. Needle Bearings

Torrington Co.—Selection of the proper bearings for any installation is facilitated by basic technical data presented in catalog 61 describing heavy duty needle bearings. It covers design features, bearing selection, sealing and lubrication. Tables list speed and life factors, as well as capacities, and hardness factors are charted.

76. Steel & Organic Coatings

International Nickel Co.—"Effect of Composition of Steel on the Performance of Organic Coatings in Atmospheric Exposure" is an 8-page bulletin (A-156) which contains tables and illustrations. It covers results from tests which indicate that the more corrosion resistant a steel is, the more enduring the protective value of a paint covering.

77. Double End Machines

Walter P. Hill, Inc.—Data on a line of horizontal double end machines that can bore, chamfer, burr, mill, center, flare or spin tubular and solid metal parts at production rates up to 6000 per hour are given in 2-page catalog sheet.

78. Flexible Metal Hose

Flexonics Corp.—32-page illustrated catalog 130R gives performance and application data on Rex-Weld corrugated metal, Rex-Tube convoluted, Rex-Flex stainless steel flexible metal and heavy duty stainless steel hose, assemblies and fittings. Covered are sizes and types for handling practically every type of fluid under wide range of temperature and pressure conditions.

79. Welding Products

Ampco Metal, Inc.—Line of products for use with metal-arc, carbon-arc, inert gas, tungsten-arc, submerged-arc and inert gas consumable electrode welding processes are covered in 24-page illustrated bulletin W-17. Engineering and general data are included, along with preheat and weldability charts, machining information and recommended currents.

80. Abrasive Snagging Wheels

Simonds Abrasive Co. — Latest grinding wheel recommendations for various materials, including titanium alloy, are found in 12-page illustrated bulletin "Abrasive Snagging Wheels for Steel Mills and Foundries."

81. Tube Blowers

Diamond Power Specialty Corp.—The model G9B fixed position, rotating element blower is designed to clean a large number of boiler tubes by sweeping through a predetermined arc. It is also applicable to superheaters, reheaters, economizers, stills and similar tube type units operating at pressures to 1500 psi. Ask for 8-page bulletin No. 1137.

82. Blowers & Pumps

Sutorbilt Corp.—Specifications, construction and operation data on line of standard and heavy duty blowers, gas and vacuum pumps are found in 8-page bulletin No. 59 D. Blowers deliver gas or air up to 30,000 cfm at pressures or vacuums up to 12 lb. Performance examples are given.

83. Mobile Crane

Bay City Shovels, Inc.—The story of the CraneMobile is effectively related and illustrated in 16-page pocket-size booklet, "All Lifts Are Easier with a CraneMobile." Via this booklet, reader can examine the carrier, crane cab and construction and operating characteristics. Crane is made in four sizes with choice of seven mountings. Capacities range from 10 to 25 tons.

84. Filtration Unit

Permutit Co.—20-page illustrated bulletin 2204B covers Precipitator unit for removing impurities from liquids by precipitation, adsorption, settling and filtration. Three basic designs are shown, with principles, design features, flow diagrams and other data. Capacities range between 50 and 6940 gpm. Chief uses

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are in water softening and removal of turbidity, color, taste, alkalinity, silica and fluorides.

85. Welding End Valves

Edwards Valves, Inc.—4-page illustrated bulletin 507 lists socket welding end and butt welding end dimensions of various pressure class valves as approved by the American Welding Society. Valve sizes covered range from ¼ to 16 in.

86. Refractories

Ironton Fire Brick Co.—Bulletins 103 and 104 illustrate and describe high duty dry press fire brick and refractory insulating concretes that can be mixed and cast in place. Applications for both types of product are shown. Castable types are of aluminum silica base and are available for service up to 3000° F.

EDITORIAL ARTICLES
Available in Limited Quantities

87. Small Parts Handling

"Small Parts Handling—Two Part System Means Perpetual Positioning" is title of STEEL article which describes how a drop-bottom box and stand feed small parts at work height in two Ford Stamping plants. Result is 25 per cent production increase per shift on each operation.

88. Hardening Cast Iron

Hardenability of cast iron depends on the analysis, structure and as-cast hardness plus the stability of pearlite. For high quality, it is necessary to watch these factors and the heat treat process. For the story get STEEL article "Inside Look at Hardening Cast Iron" by J. Obrebski, metallurgist, Monarch Machine Tool Co.

89. New Alloy

Technical Editor Dr. A. G. Gray, in STEEL article "New Alloy: Boost to Turbines; Relief for Stockpile," relates how Timken metallurgists reduced nickel content of their tried and proved 16-25-6 alloy by 40 per cent. High temperature properties are as good as ever and ductility is even better.

90. Titanium Casting

Finding a mold material that would stand up under molten titanium has up to now been a big headache. National Research has solved this problem and is ready to grant licenses. Get STEEL article "Titanium Casting . . . Process Takes Out the Bugs."

BUYERS OF STAINLESS PLATE have always found Carlson Weekly Stock Lists important. These lists tell them what they want to know about the *size, gauge* and *type* of stainless plate *in stock* at G. O. Carlson, Inc. Some time ago publication of these valuable lists had to be stopped . . . *but now they are again available!*

Carlson Weekly Stock Lists enable users to see what is available for immediate needs. They can order Stainless Steel Plate produced to chemical industry standards of excellence right "from stock", pattern cut if desired. G. O. Carlson, Inc. provides this time-saving service to the ever-increasing number of Stainless plate users . . . and prompt delivery is more than a promise, it's a fact!

We will be glad to send you these weekly Stock Lists as a reminder of what's available at G. O. Carlson, Inc. A note from you will "do the trick".

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Conco Building Products, Inc.—Brick, Tile, Stone

NEW PRODUCTS and equipment

(Continued from p. 454)

traveling speed makes it particularly applicable for yard jobs that require movement of materials over large areas. Large pneumatic tires and exceptionally high clearance are features that fit this function.

Extra heavy drive axle and oscillating trail axle permit operation

over unimproved or semi-improved surfaces. The Yardloader truck has standard lift height of 122 inches, uses a low pressure hydraulic system. Baker-Lull Corp., subsidiary of Baker-Raulang Co., Dept. ST, 1230 W. 80th St., Cleveland 2, O.

FOR MORE DATA—CIRCLE REPLY CARD NO. 12

Automatic Fire Extinguisher

. . . suspended where need exists

Automatic fire extinguisher, suspended where it's needed most, permits fast installation of protection directly over fire hazards. Installation entails nothing more than suspending the extinguisher from a hook. No piping is required.

Redi-Matic extinguishers are stored pressure, vaporizing liquid units with a one-gallon capacity. Standard units are approved by Underwriters' Laboratories Inc. When temperature reaches melting point of a fusible element in the sprinkler head, extinguisher instantly discharges CBM in a fog-like spray. Stop-Fire Inc., Dept. ST, 125 Ashland Place, Brooklyn 1, N. Y.

FOR MORE DATA—CIRCLE REPLY CARD NO. 13

Mechanical Tracing Accessory

. . . drives surface inspector

This mechanical tracing accessory is designed for use with the manufacturer's Surfindicator — a surface roughness measuring instrument. Motor drive provides

Beauty... as far as the eye can see!

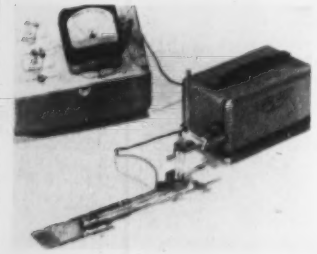
When you travel America's highways there is always beauty to behold . . . beauty as far as the eye can see. Part of that beauty lies in your automobile itself and the Motor Products Corporation, manufacturers of Instrument Panels, Garnish Mouldings, Glove Compartment Doors and other formed metal parts, is proud of the role it plays in making fine automobiles even finer. Motor Products parts are designed to complement and magnify the beauty of America's most beautiful cars . . . built to equal America's highest standard of quality.

MOTOR PRODUCTS CORPORATION

11801 Mack Avenue • Detroit 14, Michigan

mechanical movement of the indicator pickup along a surface being inspected. It is designed for special applications that extend usefulness of the basic indicator beyond the range that is practical with hand operation.

Instant reversal, constant speed and low vibration level of the unit



insure surface roughness measurement of high accuracy. Brush Electronics Co., Equipment Division SP, 3405 Perkins Ave., Cleveland 14, O.

FOR MORE DATA—CIRCLE REPLY CARD NO. 14

Pipe Specification Card

. . . covers ASTM, ASME specs

Data card designed to assist those involved in selection, application and installation of carbon, alloy and stainless steel pipe is available free from this manufacturer. Card contains information on dimensions, weights, specifications, grades and analyses of seamless and welded types.

It presents pertinent data on six pipe size schedules and complete reference data to steels covered by ASTM and ASME piping specs. Tubular Products Division, Babcock & Wilcox Co., Dept. ST, Beaver Falls, Pa.

FOR MORE DATA—CIRCLE REPLY CARD NO. 15

Portable Plating Barrel

. . . weighs 28 pounds

This plating barrel, weighing 28 pounds, is placed easily in the plating tank by hand. V-shaped cathode contact notch fits cathode rod at any point on that rod.

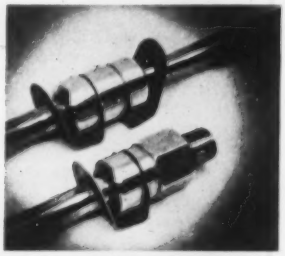
Complete Lucite end plates are reported to reduce cost, support plater, protect the cylinder and mechanism in handling. Reversing switch with geared head motor drive turns the cylinder in either direction and holds positively for loading and unloading. Belke Mfg. Co., Dept. ST, 947 N. Cicero Ave., Chicago 51, Ill.

FOR MORE DATA—CIRCLE REPLY CARD NO. 16

Tube or Pipe Coupling

. . . any range, any purpose

Designed to simplify process of connecting tubing or pipe in any size range and for any purpose,



this coupling requires no threading, flares, ferrels or tools of any kind to make the connection. In a matter of seconds, an inexperienced operator can connect tubing or pipe into a sealed connection that can withstand extremely high pressures.

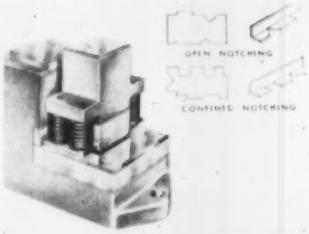
One principle is grooving of interior. At each end are grooves containing rubber O-rings or silicone or tefalon rings, depending on use. Sleeve is tapered on the inside to allow for any variation in outside diameter. Master Enterprise Corp. of America, Dept. ST, Boulder Bldg., Tulsa, Okla.

FOR MORE DATA—CIRCLE REPLY CARD NO. 17

Notching Unit Line

. . . open and confined types

Notching unit line, in both open and confined types, has self-contained, permanently-aligned punch-



es and dies that eliminate usual time-consuming adjustments. These units eliminate all attachments to the upper press ram. Lifter springs, punch and die are contained in a single holder.

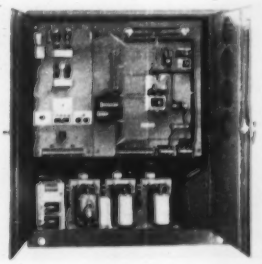
Design permits quick setup on T-slotted plates or template mounted in or out of the press, providing for maximum use and reuse. Toolset, division of General Riveters Inc., Dept. ST, 777 Hertel Ave., Buffalo 7, N. Y.

FOR MORE DATA—CIRCLE REPLY CARD NO. 18

Mercury Rectifier Power Drive

. . . a-c to controlled d-c

Mercury rectifier variable-voltage power drive provides a way to convert alternating current to controlled d-c variable voltage for application to adjustable-speed equipment. It employs mercury arc rectification, with a new single anode



mercury pool rectifier tube, known as Xatron.

Drive consists of operator control station, adjustable-speed drive motor and control unit enclosed in compact cabinet. Reliance Electric & Engineering Co., Dept. ST, 1088 Ivanhoe Rd., Cleveland 10, O.

FOR MORE DATA—CIRCLE REPLY CARD NO. 19

Hydraulic Battery Extractor

. . . no need to break cases

Portable hydraulic battery extractor eliminates need for breaking battery cases to extract plates. Machine will pull about 2000 batteries in an 8-hour day, operated by one, two or three men.

Extractor is designed to pull any size battery without adjustment of any kind. Batteries are loaded on the conveyor drained or wet. Speed of the machine is obtained by automatically controlled instant action of hooks or fingers which grab and release the lugs. Sonken-Galamba Distributors Inc., 2nd & Riverview, Kansas City, Kan.

FOR MORE DATA—CIRCLE REPLY CARD NO. 20

stainless steel bar users :

Get all three at CRUCIBLE

faster *delivery* —

Our unique mill scheduling operation is geared to handle any size order for stainless steel bars — whether it be for pounds or carload lots. And we operate our own national chain of warehouses to enable us to make immediate shipments to you directly from a local source over which we maintain complete control.

maximum *machinability* —

Recognizing the importance of good machinability, our mill metallurgists maintain close control over all manufacturing operations to insure that the machinability characteristics of each stainless bar produced is of the maximum obtainable.

complete *range* —

All our warehouses now have complete stocks of stainless and heat-resistant bars . . . in all sizes, all grades and all finishes. No matter what your requirements are in the way of stainless and heat-resistant bars we can take care of them.

Next time you need stainless steel bars, be sure you call your nearest Crucible warehouse.

CRUCIBLE

54 years of Fine steelmaking

first name in special purpose steels

STAINLESS STEEL BARS

CRUCIBLE STEEL COMPANY OF AMERICA, GENERAL SALES OFFICES, OLIVER BUILDING, PITTSBURGH, PA.

REX HIGH SPEED • TOOL • REZISTAL STAINLESS • MAX-EL • ALLOY • SPECIAL PURPOSE STEELS

HOTMARX
Where ordinary markers would flame up and burn, Hotmarx marks clearly and easily up to 2000° without smoking or running. Marks withstand weathering.

METALMARK—
For all types of marking, checking or grading where hot metal up to 800° is handled. Of highest quality, retains its smooth, clear, legible marks after metal cools. Highly weatherproof.

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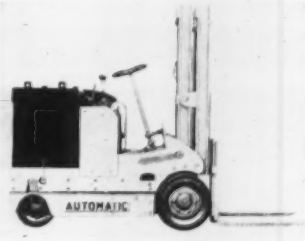
NEW PRODUCTS and equipment

Type EX Fork Truck

. . . approved for hazardous jobs

Line of electric fork trucks is approved by Underwriters' Laboratories for use in hazardous locations involving fire or explosion. Trucks will be available in 2, 3 and 4000-pound capacity models of the HF Skylift electric.

Trucks will carry type EX label. Manufacturer reports this is the



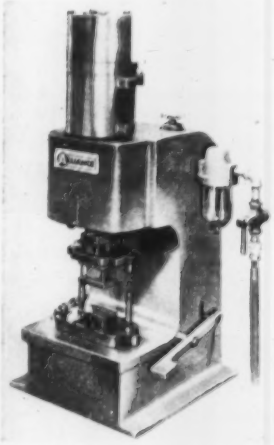
first time industrial trucks have been rated to operate under this type of conditions. Automatic Transportation Co., Dept. ST, 149 W. 87th St., Chicago 20, Ill.

FOR MORE DATA—CIRCLE REPLY CARD NO. 21

Bantam-Size Punch Press

. . . weighs only 300 pounds

Capable of delivering 5 tons of pressure when connected to a 100 psi air line, this bantam-size air-oil combination hydraulic punch press weighs only 300 pounds. Because of this total weight, the

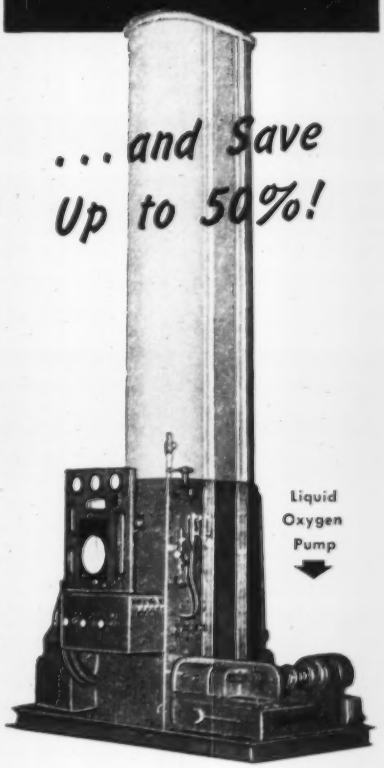


model 500 Pnu-draulic can be relocated easily. It occupies 1-1/3 sq ft of bench space.

Press can be attached to any shop air line; it has no motor and uses no electric power, pumps

NOW-Make Your Own Oxygen and Nitrogen in One Generator

. . . and Save Up to 50%!



With INDEPENDENT'S newly-designed generators, you can make your own high-purity oxygen and nitrogen from **the free air** . . . and in the **same generator.**

You reduce costs up to 50% by eliminating handling costs . . . vaporizing costs . . . evaporation losses . . . residual losses . . . and transportation costs.

INDEPENDENT Generators are available in any **capacity,** any **purity** and any **pressure.** Put your oxygen-nitrogen problem up to us . . . our engineering department will gladly submit recommendations . . . no obligation, of course!

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O'FALLON 6, ILLINOIS

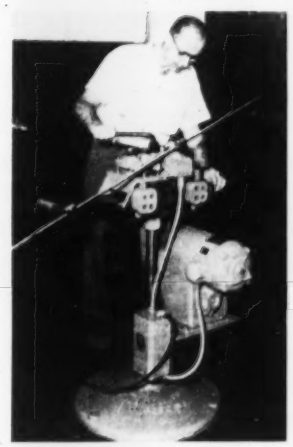
or cooling water. Hydraulic pressure is generated by an integral air-actuated booster. Pressure range is 100 to 10,000 pounds. Alliance Mfg. Co., Dept. ST, Alliance, O.

FOR MORE DATA—CIRCLE REPLY CARD NO. 22

Improved Power Straightener

. . . speed control simplified

Variable speed drive unit in place of single speed motor is one improvement made in this light duty model power-driven straightener. The variable speed drive



simplifies control of output speed to conform to job requirements. Straightener is suitable for material up to 6 inches wide and 1/8-inch maximum in cold rolled steel.

Among specifications is a 5 to 1 ratio variable speed drive, output 10 to 50 fpm and mercury switch loop control arrangement. The straightener can also be employed for material in strip form. Same type of straightener is also available in 10 and 12-inch capacity. U. S. Tool Co. Inc., Dept. ST, Ampere (E. Orange) N. J.

FOR MORE DATA—CIRCLE REPLY CARD NO. 23

Chemical Application

. . . prevents battery corrosion

Corro-Vent is a noncorrosive chemical application that is reported to prevent storage battery corrosion. To apply, the chemical is simply painted on battery terminals, frame and connecting rods

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WITH "3-POINT LANDING"

Here's just the cart you need for wheeling *coal, scrap, chips, turnings, borings* and similar heavy materials. All-steel, completely welded and reinforced. Made extra strong and rugged for heavy duty service. Dumps easily. Rests securely in any one of the three positions shown here. Available with roller bearings, if desired.

Write for Circular No. 50.

STERLING WHEELBARROW CO., Milwaukee 14, Wis.

Look for this Mark of STERLING Quality

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Check our Stampings Division — for short run or high production stampings.

GENERAL ELECTRIC — Used Laminum Shims for 20 years

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ADAMS — Used Laminum Shims for 20 years

WORTHINGTON — Used Laminum shims for 24 years

Ingersoll-Rand — Used Laminum shims for 25 years

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Used Laminum shims for 20 years

Here are a few of our older customers — who with hundreds of other companies use the foolproof, accurate Laminated Shim method to gain exact fit and save time in assembly . . . and at the same time gain a "built-in" adjustment for service wear. Get the full story — find out why so many design leaders specify **Laminated Shims!**

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NEW PRODUCTS and equipment

with brush attached to screw cap of the 8-ounce container. Result: Lifetime corrosion proofing.

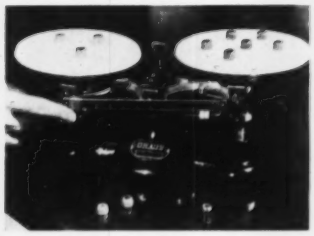
Each can contains sufficient applications for 40 batteries. Balari Laboratory Dept. ST, 6850 Betts Ave., Cincinnati 24, O.

FOR MORE DATA—CIRCLE REPLY CARD NO. 24

Titanium Alloy Fasteners

. . . same size, weight halved

Step toward reducing fastener weight has been taken by the manufacturer with announcement of production of commercially-available titanium lock nuts. Made of high-strength titanium alloy, these fasteners will meet AN tensile



strength requirements for steel nuts of the same thread size, but will weigh less than half as much as steel hex nuts.

First production will be of 12-point (double hex) nuts with nylon locking collars, in sizes from 5/16 to ⅝-inch. Other types will be added. Special permanent coating developed for these fasteners will minimize seizing and galling. Elastic Stop Nut Corp. of America, Dept. ST, Union, N. J.

FOR MORE DATA—CIRCLE REPLY CARD NO. 25

Brinell Testers

. . . indexes parts automatically

Semiautomatic Brinell testing machine indexes test pieces through both spot grinding and testing stations, cutting required labor force in half. Crankshafts, gun barrels or other shaft-like parts are fed into the machine at a rate of 400 pieces per hour. They slide out, ready for inspection.

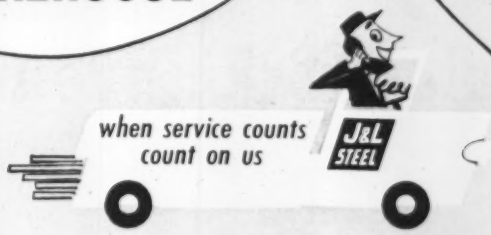
Called model RCB, the tester has a 30-inch work opening, is operated hydraulically. Detroit Testing Machine Co., Dept. ST, 9390 Grinnell Ave., Detroit 13, Mich.

FOR MORE DATA—CIRCLE REPLY CARD NO. 26

going down the drain... need help?

Call your nearest

J&L STEEL WAREHOUSE



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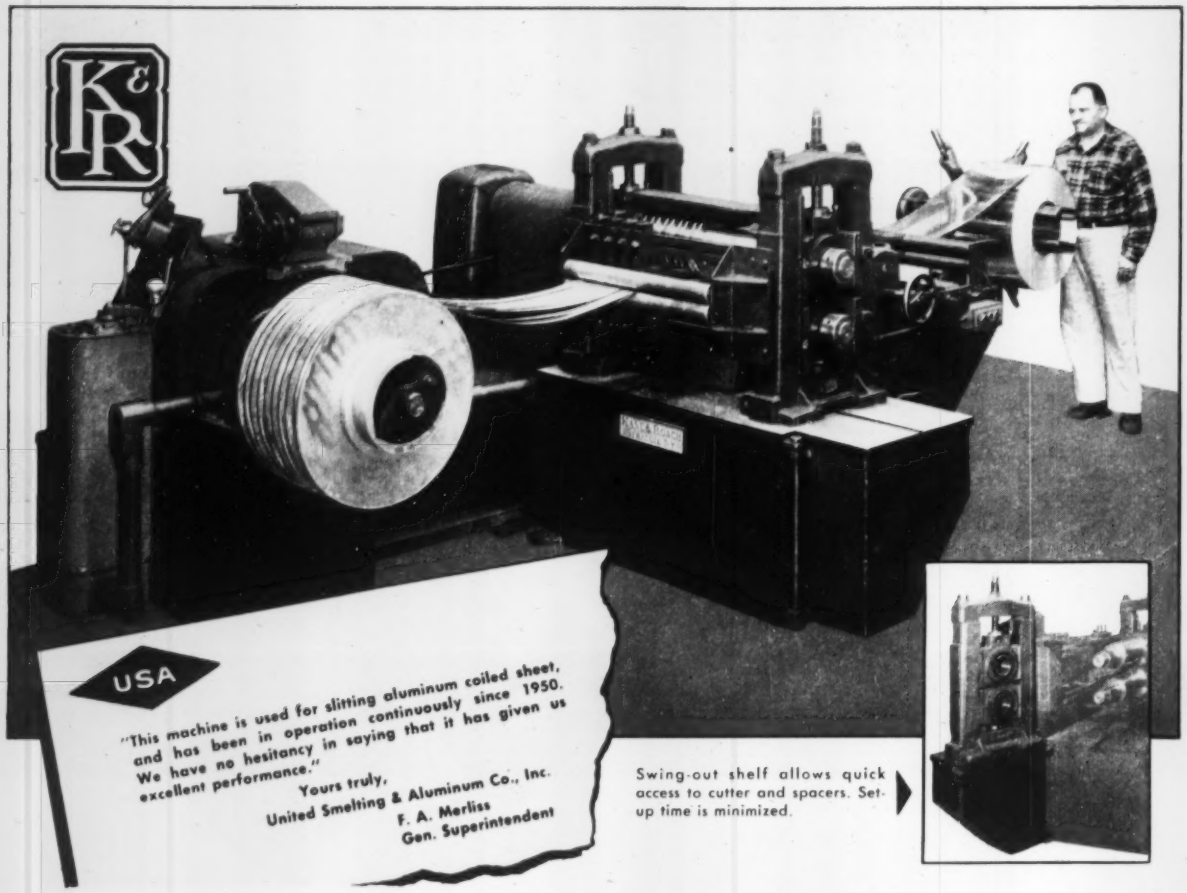
J&L STEEL

Jones & Laughlin

STEEL CORPORATION — *Warehouse Division*



USA

"This machine is used for slitting aluminum coiled sheet, and has been in operation continuously since 1950. We have no hesitancy in saying that it has given us excellent performance."

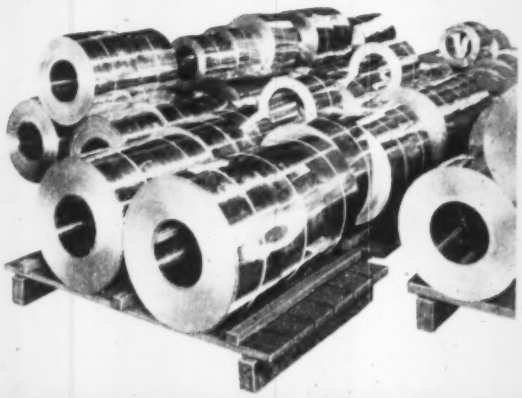
Yours truly,
United Smelting & Aluminum Co., Inc.
F. A. Merliss
Gen. Superintendent

Swing-out shelf allows quick access to cutter and spacers. Set-up time is minimized.

Reduce your coil stock inventory!

Buy your coil stock in mill sizes at mill prices—slit it to the exact widths you want as needed—and you're well on the way to a much smaller inventory . . . better control of production . . . lower material costs.

Like United Smelting & Aluminum, many firms have found that a K&R Slitting Line is fast—accurate—economical. Learn what a K&R Line can do in your plant. Our engineers will furnish recommendations, operating data, estimates—no cost, no obligation. Write today without obligation.



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Special Metalworking Equipment

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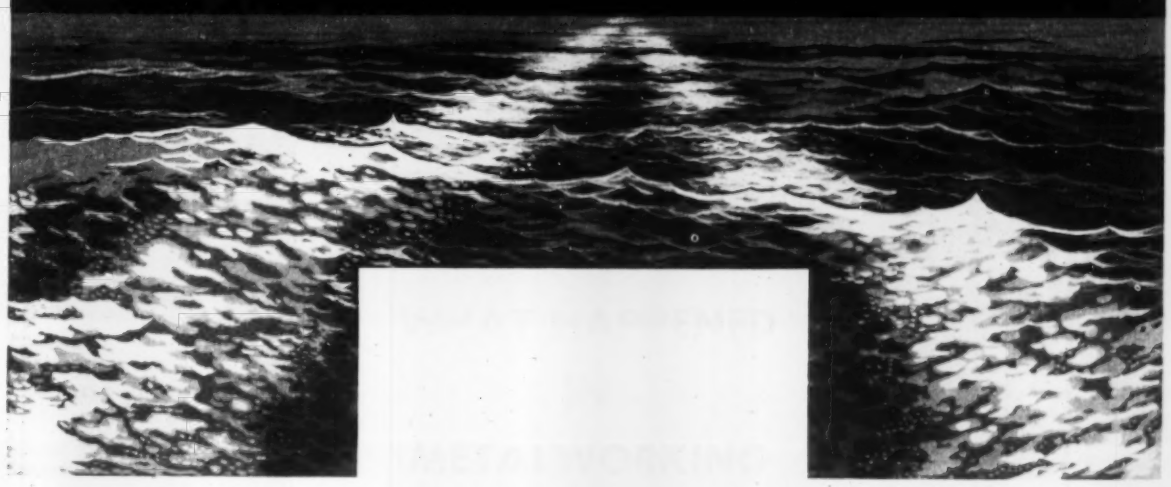
IN THE WAKE OF 1953



JANUARY

Jan. 1—With the stock market at its best level in 22 years and the Eisenhower administration about to take office, industry leaders predict high-level business activity for 1953.

Mangaslag Inc., Fort Worth, Tex., signs a contract with the government for the construction of the first sizable pilot plant for the recovery of ferromanganese from open-hearth steel furnace slag. Coxton, Pa., is to be the plant site and construction is scheduled to be completed in a year.

Jan. 6—1952 proved to be the biggest expansion year in the history of the steel industry, American Iron & Steel Institute reports. Steel production capacity increased during the year by nearly 9 million tons, bringing the total capacity for the nation to 117.5 million net tons annually.

Atomic Energy Commission awards Blaw-Knox Co. a $40-million contract for construction of a chemical plant at the Hanford Works in Richland, Wash.

Jan. 7—Railroad unions demand guaranteed annual 3-per-cent wage boost or 6 cents per hour on the basis of increased productivity.

President Harry Truman, whose days to remain in the White House number only eight, makes no recommendations to Congress in his "State of the Union" message. He warns Russia of America's power because of the hydrogen bomb.

Republic Steel Corp. enters the steel kitchen business under its own name with a $1-million retooling program at the Berger Mfg. Division in Canton, O.

EISENHOWER'S INAUGURATION
. . . returns GOP to White House

Republican Budget Cry: "Cut It"

Jan. 9—Republicans shout a loud "cut it" in response to President Truman's proposed $78-billion budget. President-elect Eisenhower and Sen. Robert Taft say the budget should be nearer $70 billion.

Jan. 11 — Non-Soviet European countries produced a record quantity of steel in 1952, the United Nations Economic Commission for Europe reports. Crude steel production hit 73.8 million metric tons in Eastern and Western Europe, the latter producing 63 million tons of the total.

Jan. 12 — Production Advisory Committee recommends that the government purchase $300 million worth of new machine tools each year in order to keep its inventory of 500,000 tools up to date.

Jan. 14—President Truman sends an economic message to Congress forecasting continued prosperity in the U.S. during 1953. But he warns that steps should be taken to guard against possible deflation-

ary tendencies when the defense effort slackens. He recommends retaining present tax levels and direct controls on materials, prices and wages.

Jan. 15—Inland Steel Co. pours its 80 millionth ton of steel ingots today from one of its four new open-hearth furnaces at its Indiana Harbor, Ind., plant.

Homburg Sales Zoom

Jan. 20—Dwight D. Eisenhower becomes President of the United States.

Ceiling price increases amounting to a half cent per pound for primary aluminum pig and ingots and a 4-per-cent increase on fabricated products are granted Aluminum Co. of America, Reynolds Metals Co. and Kaiser Aluminum & Chemical Corp.

Jan. 21—Defense Production Administration announces its approval of a fast tax write-off certificate for Harvey Machine Co. Inc. for the construction of a $65-million aluminum plant in Oregon.

Jan. 22—American Iron & Steel Institute reports that iron and steel industries spent a record $1.17 billion for expansion and improvements in facilities in 1952.

GM Head Sells His Stock

Jan. 23—Charles E. Wilson, General Motors Corp. president, agrees to sell his GM stock amounting to about $2.5 million to become secretary of defense.

Workers of Cleveland Pneumatic Tool Co., Cleveland, purchase all the stock in the company, through their two profit-sharing trusts, for $11.8 million.

Jan. 28—National Production Authority announces that allotments of carbon steel for consumer durable goods for the second quarter of this year have been boosted to 90 per cent of pre-Korean war base period.

Jan. 29—Steel companies reporting 1952 earnings show a decline in income from 1951 due to the two-month steel strike during the summer.

ACTIVITY ON CAPITOL HILL
. . . as bureaucracy trimming begins

Jan. 31—Wheland Co., Chattanooga, Tenn., seeks DPA approval for a fast tax write-off certificate to build a $70-million alumina and primary aluminum reduction plant.

FEBRUARY

Feb. 2 — President Eisenhower makes his first "State of the Union" message to Congress. He pledges efforts to end wage, price and materials controls.

Feb. 3—Defense Production Administration says Canada will ship an additional 44 million pounds of aluminum to the U.S. Originally destined for Britain, the aluminum will help offset the U.S. loss caused by recent power shortages in the Pacific Northwest and Tennessee valley.

New Construction Pace Quickens

Commerce and Labor departments report January new construction orders totaled more than $2.3 billion, up 6 per cent over 1952.

Feb. 4—Commerce department figures reveal U. S. manufacturers sold $276.5 billion worth of goods in 1952, up 5 per cent over 1951.

Feb. 5 — Senate Finance Committee approves a bill to permit duty-free copper imports until June 30, 1954.

Kropp-Forge Co., Chicago, has begun manufacturing titanium aircraft parts for the Army.

Feb. 6—NPA announces decontrol of tin in the U.S. Consumers and dealers, however, must still submit monthly reports.

Eisenhower administration machinery for decontrols steps up its pace and removes all wage and salary controls plus restrictions on a variety of consumer goods.

Feb. 9—Sen. Robert A. Taft states tax reduction should be voted in 1954 to take effect in the fiscal year starting July 1, 1954.

National Labor Relations Board rules competing unions can't stage representation elections in plants during full term of an agreement covered by a five-year contract.

Census Bureau figures show that retailers sold $164 billion worth of goods in 1952, 4 per cent above 1951.

Aluminum Association reports that primary aluminum in the U.S. in 1952 hit an all-time high, 1.8 billion pounds, 12 per cent above the previous year.

Feb. 11—Senate sends a bill to the White House continuing the suspension of tariff duties on imported copper.

You Have It, Then You Don't

Personal income in 1952 reached a record $268.5 billion, 5½ per cent above 1951, Commerce department officials report. Income after taxes, however, was $234-billion, 4 per cent down from '51.

Feb. 13—Government starts machinery rolling for decontrolling metals.

David J. McDonald is elected to succeed Philip Murray as president of the United Steelworkers of America-CIO in the U.S. and Canada.

Feb. 14—Ceilings on automobile production are lifted, paving the way for a 6-million-car year. Big

question is: "Can they sell that many?"

Feb. 16—Government signs a contract with the Miami Copper Co. for recovering 250 million pounds of copper from the undeveloped deposit of low-grade ore in the Globe-Miami Mining district of Arizona.

Ford Motor Co. announces the purchase of 160-acre site in San Jose, Calif., for construction of a $35-$50-million assembly plant. Work will begin immediately. Ford says it will spend at least $500 million for expansion in next three years.

Action in the Right Direction

Feb. 17 — House Ways & Means Committee votes for 10 per cent individual income tax cut to become effective June 30.

Feb. 19—Labor Secretary Martin Durkin creates a 15-man advisory committee — five members each from labor, management and the public—to begin work Feb. 24 on proposed amendments to the Taft-Hartley Act.

Feb. 21 — *Ward's Automotive Reports* predicts car production in the first half of the year will hit 3.2 million.

Feb. 25—Administration officials express doubts that the budget can be balanced because of the necessity of continuing high defense-foreign aid spending.

Youngstown Sheet & Tube Co. places its new No. 3 blast furnace into operation at Indiana Harbor, Ind., works. The furnace is 105 feet high and has a rated capacity of 1500 tons daily.

Production of goods and services in the nation (gross national product) in 1952 hit a record $346 billion.

Feb. 26—Inland Steel Co. embarks on a $50-million project for mining iron ore at Steep Rock lake, Ont.

Copper and aluminum controls are eliminated.

Feb. 27—Eugene G. Grace, chairman, Bethlehem Steel Corp., says Bethlehem's current expansion and modernization program will boost his company's annual steelmaking capacity to over 19 million tons at completion.

MARCH

Mar. 1—Expansion of the world's industrial production reached the record index figure of 133 in 1951, based on 1948 as 100, a United Nations study shows.

Mar. 2 — Oliver Iron Mining Co. plans to build a $60-million iron ore treatment plant at Two Harbors, Minn.

Mar. 3—Shipping officials predict a record iron ore shipment in 1953. A docking at Buffalo yesterday marked the earliest the season has ever begun.

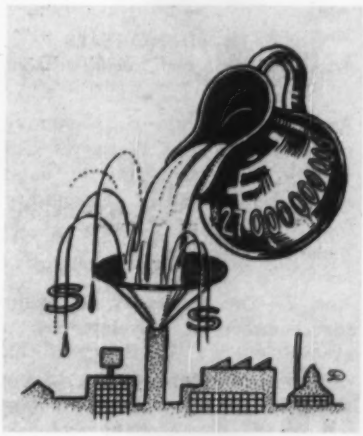
Mar. 4—U. S. Steel Corp. demonstrates a new process of extruding high-alloy seamless steel tubing at its Gary, Ind., plant.

Zinc Tumble No. 5

Mar. 5—Zinc suffers its fifth price reduction this year as the price is trimmed to 11 cents, East St. Louis basis. This is the lowest level for the metal since April, 1950.

Alfred Krupp, Germany's industrial magnate, is ordered by Western Allies to sell his coal, steel and iron holdings, and in return he will have sole control over the remainder of the estimated $95 million worth of family property.

Mar. 8—A quick check around the industrial circuit shows no signs of a falling off of steel production at least through the second quarter. Automakers are rolling at capacity and other industries, such as appliances, are enjoying spring business pickups.



POURED BACK INTO INDUSTRY
. . . a record capital investment

Mar. 10—Labor unions are upheld in two cases involving charges of violations of the T-H law limiting feather-bedding.

Mar. 11—U. S. Steel Corp. increases stainless steel prices by 3 per cent on some grades and 2 per cent on others.

Mar. 12 — David J. McDonald, United Steelworkers of America president, says his union will organize workers in new iron ore mines in Labrador and Quebec, metal mines in the West and possibly bauxite and iron ore mines in South America.

Mar. 16—Continued high demand by automotive industries keeps steel production at near 100-per-cent-capacity operating level.

Under Defense Materials System the only materials which will be controlled after June 30 will be for atomic energy needs and direct defense.

U. S. Steel has notified its customers that current prices on tin mill products will continue in effect until after Sept. 30.

General American Transportation Corp., Chicago, has found a method of nickel-plating chemical tank cars by chemical means. Officials say the firm will build two plants to utilize the process, one in Los Angeles and the other in East Chicago, Ind.

Mar. 18—OPS ends price curbs on all products which remain under ceilings six weeks prior to the scheduled decontrol date, Apr. 30.

Railroad Workers Win Pay Hike

Mar. 19—An increase of 4 cents per hour, retroactive to Dec. 1, 1952, was awarded to railroad workers in 19 unions.

Cleveland Cliffs Iron Co. has raised

iron ore prices for the second quarter to $9.70 a ton, a hike of 28 cents to the consumer.

A new metal known as Lurium—actually aluminum that is 99.99 per cent pure, the highest ever achieved commercially, has been produced in West Germany and is being introduced here. Light in weight, the metal has a permanently lustrous high finish which will not tarnish even if submerged in salt water.

National Production Authority ends its allocation of copper and brass scrap today.

Mar. 23—Walter Reuther, United Auto Workers-CIO president, says his union will not negotiate long-term contracts unless demands for pay rate and pension increases are met by automakers.

Economic and military aid by the U.S. to foreign nations totaled $5.6-billion in 1952, 10 per cent above 1951, the Commerce department reports.

Mar. 24—Reconstruction Finance Corp. is scheduled to end June 30, 1954, and gradual liquidation will begin at once.

U.S. business firms plan to spend a record $27 billion on new plant and equipment in 1953, a Securities & Exchange Commission survey indicates.

Mar. 25—The impact of the return of German manufacturers to the market scene is being felt more and more. Latest expansion step is one of Schiess A.G. of Duesseldorf, Germany, to form an American affiliate, American Schiess Corp., to sell machine tools here.

Ernest T. Weir, board chairman, National Steel Corp., predicts that the U.S. steel industry will increase its annual capacity to 121 million tons this year.

Mar. 27—Crane Co., Chicago, is trying to obtain a federal loan to build a $26-million titanium plant to become the nation's largest producer of the metal. Government will get first call on output.

Machine Tool Orders Rise

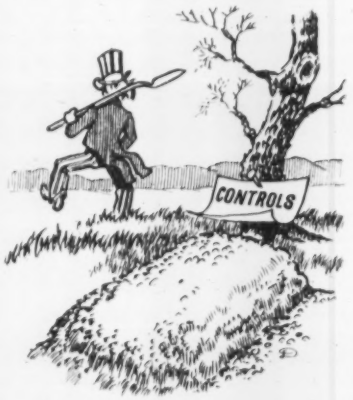
Mar. 28—Makers of machine tools booked a total of $85 million worth of new orders in February, 12 per cent above January.

Mar. 30—Expansion goal for blast furnace capacity has been boosted to 87 million tons by the government to assure sufficient pig iron for production of steel ingots for mobilization needs.

Colorado Fuel & Iron Corp.'s Claymont, Del., plant has purchased 60,000 tons of basic pig iron from Australia. Shipment of the first 20,000 tons is to begin within five months.

APRIL

Apr. 1—Shipyard activity decline continues and no recovery is foreseen in the immediate future. Only 82 ships are on order or being built, the lowest point in shipbuilding in 21 months.



DEATH—BUT NO TEARS
. . . most controls end, freeing economy

Apr. 6 — Arthur S. Flemming, president of Ohio Wesleyan University, Delaware, O., is nominated by President Eisenhower for the post of director of defense mobilization.

Apr. 7—The door may be opened for commercial development in atomic energy if Congress approves a recommendation to end the government's absolute monopoly in the development and possession of fissionable materials. President Eisenhower, the Atomic Energy Commission and National Security Council have endorsed the plan.

Apr. 8—Colorado Fuel & Iron Co. reports that it has raised its coke production 16 per cent with a new "coal washing" process. It removes all the waste materials with a less than 1-per-cent loss of coal.

Apr. 13—Benjamin Fairless, board chairman, U. S. Steel Corp., says the steel industry is suffering from "financial malnutrition" because of low rates of earnings despite 12 years of record production.

March steel production totaled 10 million tons of ingots and castings and brought the first-quarter total to a record 28.9 million tons.

Apr. 14—An $85-million expansion program is under consideration by National Steel Corp. for its subsidiary, Weirton Steel Co.

Apr. 15—Copper smelter intake of scrap copper more than doubled last month—the first full month following the end of government price controls. Mine production was down slightly, but refined copper deliveries increased, Copper Institute reports.

Nickel-Cobalt Found in Cuba

Freeport Sulphur Co. reports that it has found a deposit of at least 40 million tons of nickel-cobalt ore in the vicinty of Moa bay, near the eastern end of Cuba. A pilot plant to determine the commercial recovery possibility has been ordered.

Apr. 17 — The Navy cancels its $154-million contract for J-40 jet engines with Ford Motor Co.

Armco Steel Corp. President W. W. Sebald announces his company expects to boost steel prices soon.

Apr. 19—Jones & Laughlin Steel Corp. announces expansion and modernization plans for its container plant in Atlanta.

Apr. 20—Automakers with production at capacity are turning out cars at the rate of 7 million units

annually. The rub: Sales are at a 5.5-million annual pace.

Apr. 21 — Superior Steel Corp. starts operations in its new $7-million clad metal plant at Carnegie, Pa. Employees at the new plant bring Superior's total workforce to more than 1200, officials report.

Apr. 22 — Commerce department announces personal indebtedness at the close of 1952 reached $82 billion.

Blast furnace production of pig iron and ferroalloys set a new monthly record in March with 6.6 million tons, American Iron & Steel Institute says.

Apr. 23—Ford Motor Co. plans to build a $60-million engine plant next to its Brookpark installation in Cleveland.

Apr. 28—Record first-quarter sales are reported by the steel companies in their quarterly reports, but earnings averaging around 5 cents on the dollar are considered too low.

Apr. 30—Westinghouse Air Brake Co. announces it will purchase the earth-moving tractor and related equipment business of R. G. LeTourneau Inc.

President Eisenhower proposes an $8.5-billion cut in the Truman budget for tne fiscal year starting July 1.

MAY

May 1 — National trade barriers were removed in France, Germany, Belgium, Italy, the Netherlands and Luxembourg by forming a single market for steel. Jointly, their production amounts to 42 million tons annually.

May 2—Kaiser Mfg. Co. purchases the assets of Willys-Overland Motors Inc., Toledo, O., and a new company, Willys Motors Inc., is formed with Edgar F. Kaiser as president.

May 4—Commerce department reports that construction in the nation for the first four months of 1953 totaled $9.6 billion, 6 per cent above the like period in 1952.

Steel operations in the nation continue at 100 per cent capacity.

May 5—U. S. Steel Corp. says it will raise prices of finished products where production costs have increased, but base prices will remain unchanged.

May 6—Due to a big boost in the nation's steel output, Britain discontinues its allocations program for steel products which began 15 months ago. Production output is sufficient to meet a 6-per-cent increase in domestic demand.

May 7—CIO Steelworkers prepare for primary wage negotiations with U. S. Steel Corp. and 80 other large steel companies on May 14.

Aluminum industry broke all records with March production of nearly 209 million pounds of aluminum.

May 14—Korean war truce talks appear to be nearing final agreement and T. M. Girdler, chairman, Republic Steel Corp., declares that a peace in Korea would not reduce steel demand to the extent that many persons fear.

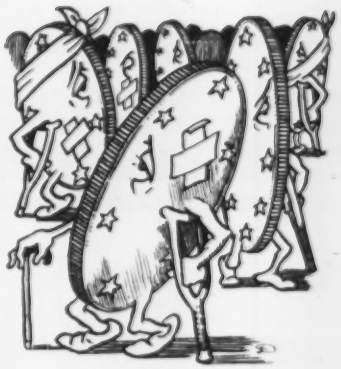
American Steel & Wire Division, U. S. Steel Corp., breaks ground for a new blast furnace in Cleveland.

May 15—Brown Boveri Corp., Swiss firm, wins an Atomic Energy Commission contract for $3.5 million worth of heavy-duty electrical equipment for the Pike county atomic project near Portsmouth, O.

May 18—McLouth Steel Corp. requests stockholders to approve a $105-million financing program for expansion at Trenton, Mich. A blast furnace, ore docks and ingot making and steel rolling facilities will be constructed.

Eisenhower and Taxes

May 20 — President Eisenhower asks for extension of excess profits tax until Dec. 31 and calls for extension of the 52 per cent rate on regular corporation profits beyond



RECORD SALES VOLUMES
. . . bring only weak dollar profits

next Apr. 1 when it is due to be cut to 47 per cent.

Electro Metallurgical Co. says its new $100-million plant for producing the alloying ingredients vital to modern special-purpose steels nears completion near Marietta, O. The firm is a division of Union Carbide & Carbon Corp., and the plant will be the largest of its kind in the world.

May 21—Effects of a five-week-old strike at Ford's Canton, O., plant are beginning to be felt in other manufacturing plants. Next week, 85,000 are expected to be laid off.

Sales of heavy and accessory equipment at the Fifth National Materials Handling Exposition in Philadelphia are reportedly running into the "millions of dollars."

Auto Industry Accord

May 22—General Motors Corp. and CIO officials announce agreement has been reached in contract changes. Employees will have 19 cents of the present 24-cent cost-of-living allowance made part of their base pay. Skilled trade workers receive an increase of 10 cents per hour.

May 25—Ford Motor Co. and CIO officials announce agreement in revising their five-year contract. Highlight is the $137.50 maximum monthly pension feature.

May 26—Defense cutbacks are be-

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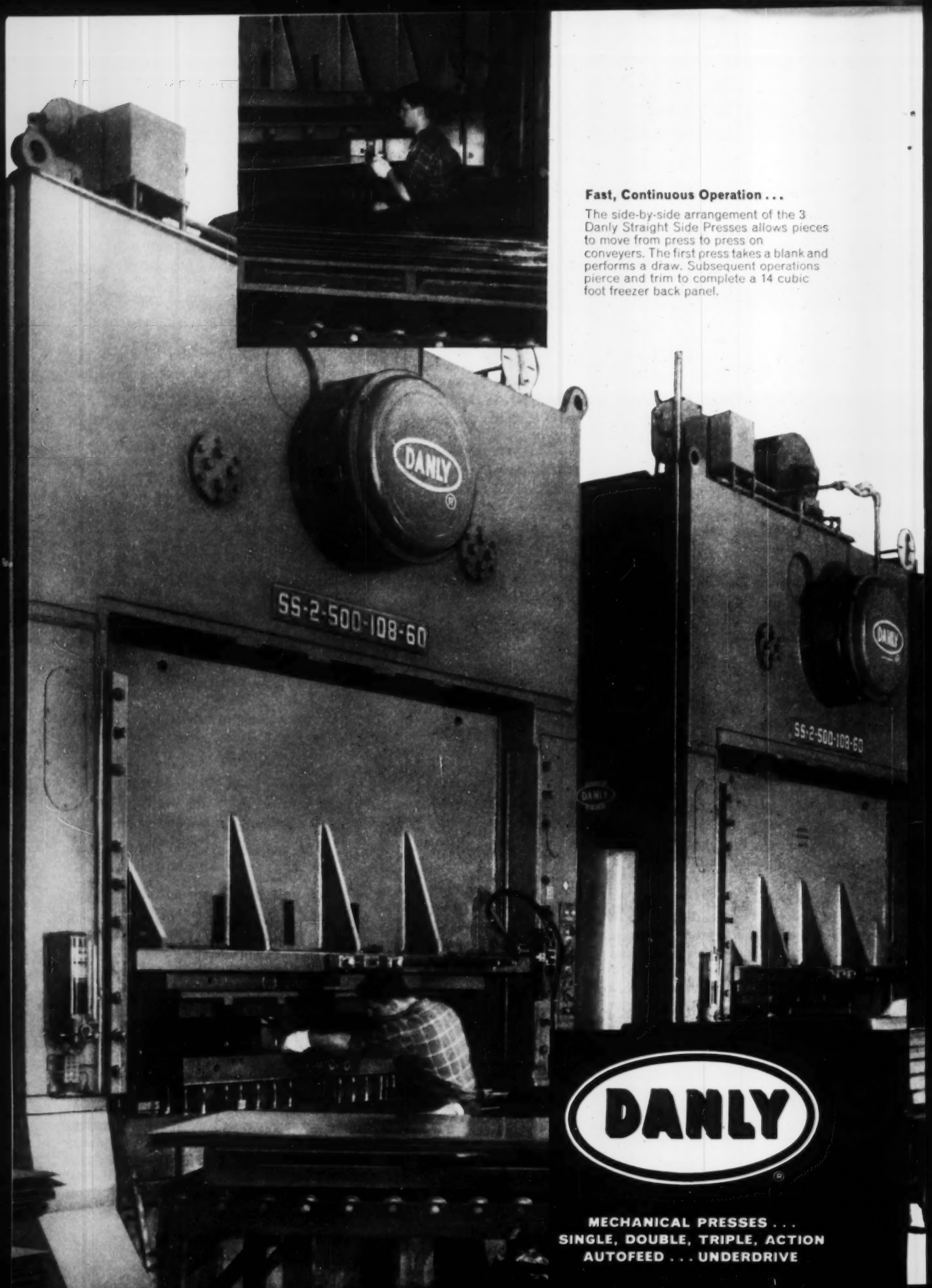


Fast, Continuous Operation . . .

The side-by-side arrangement of the 3 Danly Straight Side Presses allows pieces to move from press to press on conveyers. The first press takes a blank and performs a draw. Subsequent operations pierce and trim to complete a 14 cubic foot freezer back panel.

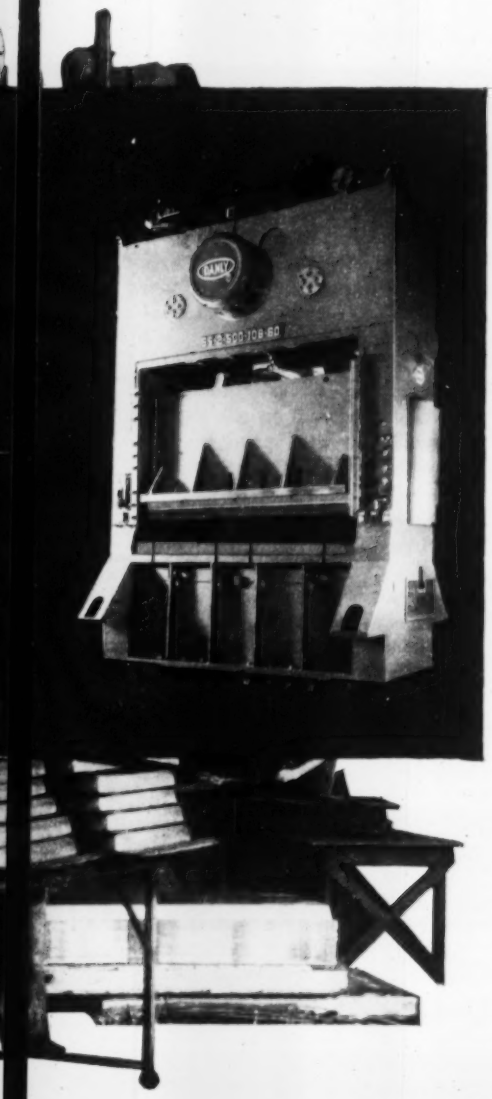
DANLY

MECHANICAL PRESSES . . .
SINGLE, DOUBLE, TRIPLE, ACTION
AUTOFEED . . . UNDERDRIVE

How can you

maintain high stamping production

with frequent job changes?



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(*Continued from Page* 471)

ing felt in the machine tool industry, National Machine Tool Builders' Association reports. New orders in April amounted to $82 million compared with $95.6 million in March.

April bookings of fabricated structural steel totaled 305,842 tons, the highest monthly figure in two years, American Institute of Steel Construction states.

GM President H. H. Curtice disagrees with UAW-CIO President Walter Reuther that mass lay-offs will result in the fourth quarter this year if the auto industry does not slacken its high pace.

National Steel Corp. signs contract with American Shipbuilding Co., Cleveland, for the construction of a new freighter. The boat will be 20 feet longer than the *Ernest T. Weir*, which is currently the longest boat ever built in a Great Lakes shipyard.

May 29 — Benjamin Fairless announces U. S. Steel Corp. will meet competitors' prices and no customer will get special benefits. Posted prices will fluctuate with demand.

GM will adapt pension plans similar to those won by the CIO at Ford and Chrysler. Employees with 30 years of service will receive $137.50 per month including $85 in Federal Social Security benefits.

May 31—International Nickel Co. of Canada signs a contract under which the U. S. purchases for quick delivery 120 million pounds of metallic nickel and 100 million pounds of electrolytic copper for defense.

JUNE

June 1—The electric utility industry reports that it contemplates spending $12 billion by the end of 1956 to boost generating capacity from present 81.4 million kw to 125.4 million kw.

June 2—Pittsburgh Steel Co. completes its $9-million open-hearth expansion at Monessen, Pa.

MOTHER-IN-LAW LEAVES
. . . *aids management-labor relations*

June 4—Both the U. S. Chamber of Commerce and the National Association of Manufacturers refuse to endorse the President's proposal to continue excess profits tax.

June 7—Steel production continues at the 100-per-cent level and officials predict the pace will remain throughout the month. Customers are still trying to balance stocks and seasonal increases in business activity are being felt.

June 9 — Secretary of Commerce Sinclair Weeks plans to set up a Business Service Agency to "maintain current prosperity and to meet adjustments or emergencies as they arise."

The first steel was poured at the Lone Star Steel Co.'s E. B. Germany plant near Daingerfield, Tex. Plant capacity is about 500,000 tons, 350,000 of which is scheduled for production of tubular goods for the oil industry.

June 11—Top U. S. Steel Corp. and United Steelworkers of America-CIO officials meet to formulate a pattern-setting wage agreement.

June 12—U. S. Steel Corp. and United Steelworkers of America-CIO agree upon an 8½-cent-per-hour wage increase which will be applied uniformly to each of the 32 job class rates now in effect. Lowest wage now becomes $1.52 per hour.

June 13—Weirton Steel Co. announces new wage increases of 8½ cents per hour, making its minimum wage rate $1.62½.

Price Boosts Follow Wage Hikes

June 16—Following on the heels of the wage increases, over-all price advances of one-fifth cent per pound for carbon steel products and proportionate increases for alloy and stainless steel products are announced by U. S. Steel Corp.

June 17—Inland Steel Co. ups its prices on steel mill products approximately $3.60 per ton as a result of the wage boosts. Other price boosts averaging about $4 are made by Bethlehem, Republic, Jones & Laughlin and Youngstown Steel. Other companies follow.

June 19—Defense department directs the Air Force to cancel contracts for 7 of the 17 heavy presses it had scheduled for the next two years.

June 20—Edward F. Howrey, chairman of the Federal Trade Commission, in a letter to a congressman, indicates that freight absorption has the FTC's blessings.

June 22 — Republic Steel Corp. opens a new seamless tube mill in South Chicago, Ill.

June 23—Republic Steel Corp. is the first steel producer to enter the plastic pipe field on a commercial basis by its purchase of Owings-Sharpe Inc., Magnolia, Ark.

June 24—Cleveland Cliffs Iron Co. boosts iron ore prices 15 cents per ton.

June 28—Sharon Steel Corp. sets a precedent in the industry by announcing it will idle most of its plant for a two-week vacation period instead of staggering vacations.

June 29 — U. S. Steel Corp. increases prices for pig iron, effective tomorrow, about 3 per cent. Basic pig price is now $56 per gross ton.

Department of Interior reports significant advances have been made in the campaign to develop methods to recover manganese from low-grade ores in the West. Work

has been conducted at a pilot plant at Boulder City, Nev.

June 30—Republic Steel Corp. has perfected a process for making powdered iron and plans to produce the powder at a new plant it will build at Toledo, O.

Automobile Manufacturers Association has asked Congress to adopt a ten-year road modernization program to help solve the nation's increasing traffic congestion and accident problems.

Office of Defense Mobilization establishes expansion goal for wide flange structural steel shapes of 2.8 million tons by July 1, 1955.

JULY

July 1 — Top administration officials and congressional leaders are deadlocked on Taft-Hartley Act changes, including the ban on secondary boycotts and closed shop.

Russia is attempting to sell platinum in London for the first time in six years.

Willys Motors Inc., idled since May 20, plans to resume car and jeep production. Studebaker says it doesn't know when it can return to full production. Both automakers along with Nash and Kaiser had to suspend operations because of the Borg-Warner strike at Muncie, Ind.

General Electric Co.'s Vice President Clarence H. Linder predicts that year-round push button weather control in an all-electric home is rapidly approaching the pocketbook of Mr. Average American.

Murray Corp. of America, Detroit, announces its purchase of Eljer Co. of Ford City, Pa., one of the nation's largest plumbing fixture manufacturers.

July 2—American Steel & Wire Division, U. S. Steel Corp., plans a $20-million expansion in Cleveland. Included in the program is a rod and billet mill.

How Do You Ban This Red?

Treasury department reports that the nation's books for the fiscal year 1953 have been closed with the largest deficit in peacetime history recorded—$9.3 billion.

July 7—McLouth Steel Corp. announces plans for financing a $105-million program to double its current output. The expansion will make McLouth an integrated producer.

Construction expenditures for the first half of 1953 hit a record $16-billion, up 8 per cent over last year.

KOREAN GUNS SILENCED
. . . but world tensions remain

July 8—Employment in the iron and steel industry reached a record high in May with an average hourly wage of $2.222 reported for 685,300 employees, according to AISI. Total payroll amounted to $281-million.

Commerce department figures show that employment in the nation hit 63 million in June, up over 1.5 million from May.

Sen. Homer Capehart (Rep., Ind.) introduces a bill which will allow five-year amortization of any capital investment in land, buildings, machinery or equipment after Dec. 31.

July 9 — House Ways & Means Committee approves the bill to extend the excess profits tax to Dec. 31.

July 10—Steel production in the nation for the first half of the year topped all records with its 57.9 million tons of ingots and steel for castings. Total exceeds the estimated combined production of Russia, the United Kingdom and the Netherlands for all of 1952.

Office of Defense Mobilization grants Bethlehem Steel Co. a fast tax write-off certificate for a $38.7-million program, which includes the expansion of wide flange facilities.

July 13—The annual rate of personal income increased a billion dollars in May to $284 billion, Commerce department says.

Another Dying Experiment

July 14—Britain's iron and steel industry is going to be put up for sale to private owners after two years of government ownership.

July 15—General Electric Co. announces record sales for the first half of the year of $1.56 billion, a 33 per cent hike over 1952.

House Appropriations Committee decides to pare the $7 million requested for the new Business Services Administration down to $4-million.

Sales by U. S. manufacturers in the first quarter of this year amounted to more than $66 billion, an increase of 9 per cent over 1952, Federal Trade Commission reports. Net profit after taxes was $2.8 billion.

A French firm in which U. S. Steel Corp. has a 49 per cent interest is preparing to develop a large high-grade manganese deposit located in French Equatorial Africa.

July 18—American Smelting & Refining Co. switches from a basing point pricing system to a delivered base price for Prime Western grade zinc.

July 21—Commerce department figures show output of major consumer durable goods for the first half of 1953 is up 40 per cent over 1952.

Truce at Last

July 26—North Korean and United Nations representatives sign the official truce agreements. Big question of the week—how will the

nation's business activity be affected? Most observers predict the impact will be minor.

July 30 — General Motors Corp.'s sales for the first half of 1953 hit a record $5.4 billion. Westinghouse Electric Corp.'s sales were $780-million for the same period, also a record.

July 31 — Interstate Commerce Commission extends the 15 per cent freight rate increase an additional 22 months until Dec. 31, 1955.

Alan Wood Steel Co. plans a cold-rolled strip mill costing $6 million. It will be located at Ivy Rock, Pa., and production is scheduled to begin in 1955.

AUGUST

Aug. 5 — Lake Superior Iron Ore Association says shipments of ore continue at a record-breaking pace. Over 3.3 million tons were brought to lower lake ports last week.

Aug. 6—Electricity output rose to a record 8.5 billion kilowatt-hours last week, up nearly 15 per cent over the same 1952 period.

Aug. 10—Goods and services production for the nation in the second quarter of this year totaled $372-billion, Commerce department reports.

Aug. 12—Caterpillar Tractor Co. will build a new plant at Decatur, Ill., to produce motor graders and industrial wheel tractors. Production is scheduled for the end of 1955.

Domestic railroad freight car production in July amounted to 6370, considerably below the 10,000 per month requested by government to hit the 8.5-million ownership goal by next July.

Fire Sweeps GM's Livonia Plant

General Motors Corp.'s Livonia (Mich.) Hydra-Matic transmission plant is struck by a $40-million fire.

Aug. 13—U. S. imports of high-grade ore from Peru are expected to reach 2 million tons in 1953. Shipments have been averaging 150,000 tons per month.

Aug. 18 — Labor department figures indicate that for the first time in over a year and a half the labor shortage has ended in some areas.

Walter Reuther, UAW-CIO head, declares his union plans to press

DINNER PAIL SAMBA
. . . labor tunes up for GAW demands

the auto industry for a guaranteed annual wage.

Youngstown Sheet & Tube Co. enters the plastic pipe field by purchasing an interest in the Perrault Fibercast Corp., Tulsa, Okla.

German industrialist Krupp and Demag, machinery producer, join forces to beat out strong British competition for the construction of a $7-million steel mill in India. Initial production plans call for capacity of 500,000 tons, growing to a million tons in four years.

Aug. 20 — Bethlehem Steel Corp. puts into operation a battery of 80 new coke ovens at its Saucon Division in Bethlehem, Pa. Project is part of company's plan to enlarge structural beam facilities.

Great Lakes Steel Corp. will rebuild and enlarge its "A" blast furnace at Zug Island, Detroit, next spring to double its capacity to 500,000 tons annually.

Aug. 21—Tin producing and consuming nations will meet in November in an effort to reach an agreement to stabilize world prices of the metal.

Aug. 25 — U. S. foreign trade authorities predict 1953's exports will set a new record with shipments anticipated at $16 billion. A quarter of the total is for military aid.

Scrap prices show weakness in Buffalo and Pittsburgh. No. 2 grade drops $2.50 per ton to $37.

Aug. 27—Bureau of Labor Statistics reports that the nation's cost of living rose to a new high in July. It was the fifth consecutive rise and stood at 114.7 per cent of the 1947-1949 average. The rate gave auto workers at the major companies a one-cent wage hike.

National Production Authority orders substantial reductions in the amounts of copper and copper-base alloy products which producers must reserve for the military and atomic needs in the first quarter, 1954.

Detroit Steel Corp. begins operation of its $12-million blast furnace at Portsmouth, O. The new unit boosts Detroit Steel's pig iron capacity to 750,000 tons annually.

Aug. 31—General Motors Corp. enters the road machinery business. It has purchased the assets of Euclid Road Machinery Co., Cleveland.

Inventories for manufacturing firms increased slightly in July to around $45 billion.

SEPTEMBER

Sept. 1—Federal Reserve figures for July show the consumer is still borrowing money under installment buying at a high rate. July's consumer credit hit $27.2 billion, with auto loans getting the lion's share.

Sept. 2 — Defense Mobilizer Arthur Flemming says fast tax write-offs granted by the government in its stockpile program will be curtailed because a large percentage of the goals is filled or adequate.

White Motor Co. plans to build a $2-million plant at Exton, Pa., for

its new Autocar Division. The factory will replace the Autocar plant at Ardmore, Pa.

U. S. Steel Corp.'s Pittsburgh Steamship Division reports that the first 4-million-ton month in the 52-year history of its fleet was recorded in August.

Sept. 3—Sagging zinc demand has prompted American Smelting Co. to return its pricing of Prime Western grade zinc to the East St. Louis, Ill., basing point system. However, a limitation of a half cent per pound will be allowed on freight charges to consumer plants.

Ford Motor Co. will begin construction soon on a new V-8 engine plant addition to its 6-cylinder factory at Brookpark, near Cleveland. Completion is scheduled for early 1955 and 3000 will be employed.

Job Openings Slip

Sept. 4—A Bureau of Labor Statistics report shows that hiring in July was at the lowest rate since 1949 and took the sharpest drop since 1945.

Sept. 5—The first plant to be denationalized in Britain was the Templeborough Rolling Mills, British Ropes Ltd. It was sold to the original owners.

Sept. 8 — Freight absorption hits the spotlight again. Some companies are already absorbing some costs and more is expected as the competition gets tighter. FTC says it's O.K. as long as the practice is done in "good faith."

Crane Co., Chicago, selects a site near Chattanooga, Tenn., for its new $25-million titanium plant. Production is scheduled for late 1954.

Steel operations dropped to 88.7 per cent of capacity over the Labor Day week end.

Television interests, pushing for Federal Communications Commission approval on color TV transmission, turn over an estimated $10 million worth of research for FTC to study. Hope is that color TV can get into operation by the first of the year.

Reconstruction Finance Corp., which is scheduled to end June 30, 1954, sets up plans to sell its nearly $700 million in loan holdings.

Sept. 10—Martin P. Durkin, labor secretary, becomes the first to resign from the Eisenhower cabinet. He claims that the White House

FREIGHT ABSORPTION
. . . increases as competition returns

repudiated an agreement to urge Congress to adopt 19 T-H amendments.

Sept. 11 — Baldwin-Lima-Hamilton lays off 900 employees because of the effects of defense cutbacks. Another 1000 are expected to be laid off before the end of the month. Other layoffs are reported at General Electric, Studebaker and Crosley Division of Avco Mfg. Co.

GM underbids Chrysler by 12 per cent on the construction of Army M-48 tanks and will be the sole producer after next April.

Sept. 14—Aluminum Co. of America begins work on a $3.6-million expansion and modernization of its Cuyahoga Hts., O., plant.

Buda Co. stockholders approve the sale of the firm's assets to Allis-Chalmers Mfg. Co.

Steel Prices Trimmed

Alan Wood Steel Co. cuts its prices to $58 for basic pig iron, $58.50 foundry, $59 malleable and $59.50 bessemer.

Sept. 15 — Westinghouse Electric Corp. reveals plans for a multimillion-dollar plant to make air conditioners at Staunton, Va.

Sept. 16 — Ford Motor Co. states that Ford expects to have equal or better productive capacity than Chevrolet by 1955.

Sept. 17—The price of lead slipped a half cent to 13½ cents a pound, New York. This reverses an uptrend which began at a low of 12 cents in April and climbed to 14 cents in July.

Navy announces plans to let contracts for 165 vessels, including its third super aircraft carrier which will cost an estimated $210 million.

Sept. 18—International Nickel Co. has developed a new process for recovering high grade iron ore (65 per cent iron) from the low-grade nickel ores in the Sudbury district of Ontario.

Sept. 21—Scrap steel tumbles to $34 a ton in Chicago, touching off a wave of pessimism about the future of steel operations.

E. I. du Pont de Nemours will begin work soon on a $3-million plant and mine near Lawtey, Fla., to produce ilemite, the raw material for titanium metal and pigments.

Sept. 23—The public and private debt has increased 6 per cent over 1952.

Sept. 22—American Can Co. opens its new multimillion-dollar container manufacturing plant at Lemoyne, Pa.

Competition American Style

Ford, traditional No. 2 car producer, outproduced Chevrolet for the second straight week. Together the two companies account for more than half of the total car output.

Sept. 29—American Zinc idles 400 at its Fairmont, Ill., plant as smelter production of Prime Western zinc is cut 25 per cent. Excessive imports are blamed.

Inland Steel Co., Chicago, plans to

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dredge a lake in Ontario, Canada, for an estimated 200 to 500 million tons of iron ore.

Sept. 30—Jones & Laughlin Steel Corp. and U. S. Steel Corp. have furloughed workers in tin mills due to seasonal drop in tin plate demand.

Tennessee Coal & Iron Division, U. S. Steel Corp., expects to increase production at its Fairfield, Ala., tin mill by 160,000 tons per year.

President Eisenhower and Treasury Secretary George Humphrey drop plans for a federal retail sales tax but hint that a manufacturers tax is being considered.

Locomotive engineers have asked the railroads for wage boosts amounting to $4 and $5 for an 8-hour day.

OCTOBER

Oct. 5—Colorado Fuel & Iron Co. officially opens it $30-million seamless tube mill at Pueblo, Colo., the first mill of its kind west of the Mississippi. Its big product: Tubing and casings for the West's rapidly expanding oil and gas industries.

Columbia Broadcasting System reportedly prepares to unveil a color tube for TV whose price will be far below the current costs of other color tubes. If true, this could mean cheaper sets than the predicted $700-plus jobs expected on the market first.

Oct. 7—Commerce and Labor department figures indicate that construction outlays in the first nine months of 1953 were the highest in history, $25.9 billion, up 7 per cent over 1952. Private spending totaled $17.5 billion, up 9 per cent over the previous year.

General Electric Co. will begin construction early in 1954 on a $1.8-million combustion laboratory at Schenectady, N. Y.

Automation in the home continues: G. E. announces that it will discontinue making wringer-type

home washing machines in April, 1954.

Oct. 9 — Defense Transportation Administrator James K. Knudson pleads with Class I railroads to meet the July, 1954, 1,850,000-freight-car goal. Still needed to hit the figure are 76,000 cars.

James Mitchell, former assistant secretary of the army, is named secretary of labor by President Eisenhower. Mr. Mitchell replaces Martin Durkin.

Return to Optimism

Oct. 12—Steel scrap prices ended their long downslide and bounced up $4 per ton, reflecting more optimism for the fourth quarter. Steel production is expected to average 90 per cent of capacity.

Oct. 14 — Third-quarter earnings coming in from the steel companies indicate that 1953 sales records will be established.

General Electric Co. breaks ground for a $5-million plant in Bloomington, Ill., to manufacture general purpose controls for industrial use.

Oct. 15—Texas Automobile Dealers Association passes a unanimous resolution condemning "unsound tactics" forced on dealers by manufacturers because of overproduction.

Oct. 16—Color TV tests being conducted for the Federal Communications Commission prompted a statement by Rosel H. Hyde, FCC chairman, that the commission may approve compatible color TV standards by Christmas.

Oct. 19—More layoffs are reported. Among the companies involved are American Locomotive Co., General Electric Corp., Curtiss-Wright Corp., U. S. Steel Corp.'s American Steel & Wire Division.

Commerce department says foreign aid by the U. S. hit a record $7 billion in fiscal 1953.

Beryllium Corp., Reading, Pa., in-

(*Please Turn to Page* 482)

Introducing the NEW *American* "60-50" Metal Turnings CRUSHER

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ALLOYS FOR THE STEEL, IRON, AND NON-FERROUS INDUSTRIES

PRODUCT*	NOMINAL COMPOSITION	USES
BORON ALLOYS		
Ferroboron Min. 10.00% Boron Grade	Aluminum.....max. 0.50% Carbon.....max. 1.50%	Increases hardenability of steel; also, for additions to malleable iron and aluminum alloys.
Min. 17.50% Boron Grade	Aluminum....max. 0.50% Carbon.....max. 0.50%	
Manganese-Boron	Boron.....min. 17.50% Manganese...approx. 75% Carbon.....max. 3% Iron.....max. 5%	Used to cleanse and deoxidize non-ferrous alloys.
Nickel-Boron	Boron.....15 to 18% Carbon.....max. 0.50% Iron.....max. 3.00% Nickel.....Balance	Special boron alloy used principally for deoxidizing nickel and its alloys.
Boron Carbide	Boron.....42 to 48% Carbon.....45 to 52%	Deoxidizer for non-ferrous alloys.
CALCIUM ALLOYS		
Calcium-Silicon	Calcium.....30 to 33% Silicon.....60 to 65% Iron.....1.50 to 3%	Deoxidizer for quality ingot steel. Also used in high-tensile gray irons.
Calcium-Manganese-Silicon	Calcium.....16 to 20% Manganese.....14 to 18% Silicon.....53 to 59%	A complex deoxidizer used widely in production of steel castings.
Calcium Metal		
Regular Grade	Calcium.....98% Balance largely Calcium Chloride	Reducing agent in metallurgical applications, deoxidizer and degasifier for non-ferrous metals.
Distilled Grade	Calcium...approx. 99.50% Balance largely Magnesium	For special applications requiring calcium of very high purity.
CHROMIUM ALLOYS		
"Simplex" Low-Carbon Ferrochrome	Chromium.....63 to 66% Silicon.....5 to 7% Carbon.....max. 0.010% or 0.025%	For producing stainless steel, particularly the low-carbon grades. The silicon in the alloy reduces metal oxides from the slag back into the bath. Rapid solubility of the alloy saves furnace time.
2% Nitrogen-Bearing Grade	Chromium.... 62 to 65% Silicon.....5 to 7% Nitrogen.. ....2 to 2.5% Carbon.....max. 0.025%	
5% Nitrogen-Bearing Grade	Chromium.... 60 to 63% Silicon.....5 to 7% Nitrogen.....5 to 6% Carbon.....max. 0.025%	
Low-Carbon Ferrochrome (Other Grades)	Chromium.....67 to 71% Silicon.....0.30 to 1.00% Carbon (10 Grades) max. 0.03 to max. 2.00%	Production of stainless steels and high-temperature alloys requiring low carbon content.
High-Carbon Ferrochrome		
Max. 4.50, 5.00, or 6.00% Carbon Grade	Chromium.....67 to 70% Silicon..... 1 to 2%	For production of engineering alloy steels and other alloy steels of moderate chromium content.
Max. 7.00% Carbon Grade	Chromium.....66 to 69% Silicon..... 1 to 3%	
Min. 7.00% Carbon Grade	Chromium.....65 to 68% Silicon..... 1 to 3%	
Nitrogen-Bearing Low-Carbon Ferrochrome	Chromium.....67 to 71% Silicon.....0.30 to 1.00% Carbon.....max. 0.10% Nitrogen....0.75 to 2.00%	For additions of nitrogen to improve properties of high-chromium steels.
"SM" Ferrochrome	Chromium.....60 to 65% Silicon ..... 4 to 6% Carbon..... 4 to 6% Manganese..... 4 to 6%	A high-solubility chromium addition for steel or iron in either furnace or ladle.

PRODUCT*	NOMINAL COMPOSITION	USES
CHROMIUM ALLOYS cont.		
Exothermic Ferrochrome	Chromium....60% approx. Carbon.....4.5% max.	These improved exothermic ladle alloys have high solubility, low carbon pickup, and high ignition temperature.
Exothermic Silicon-Chrome	Chromium...46% approx. Silicon..... 23% approx. Carbon.....1.00% max.	
Foundry Ferrochrome	Chromium.....62 to 66% Silicon..... 7 to 10% Carbon..... 5 to 7%	Developed especially for high-solubility ladle additions of chromium to improve composition and properties of cast iron.
Low-Carbon Grade	Chromium.....50 to 54% Silicon.....28 to 32% Carbon.....max. 1.25%	
Chromium Metal	Chromium.....min. 97%	Production of wide variety of non-ferrous chromium-bearing alloys, including electrical resistance alloys and high-temperature alloys.
Low-Carbon Grades	Carbon ..... max. 0.10% and 0.50% Iron.....max. 1%	
High-Carbon Grade	Chromium.....87 to 90% Carbon..... 9 to 11% Iron.....max. 1.25%	
Electrolytic	Chromium.....min. 99%	
"EM" Ferrochrome-Silicon	Chromium.....39 to 41% Silicon.....42 to 46%	
No. 1 Grade	Carbon.....max. 0.05%	Used in production of stainless steel to reduce metal oxides from the slag back into bath.
No. 2 Grade	Chromium.....36 to 39% Silicon.....36 to 39% Aluminum.....7 to 9% Carbon.....max. 0.05%	
"EM" Ferrosilicon-Chrome	Chromium.....50 to 54% Silicon.....28 to 32% Carbon.....max. 1.25%	For adding chromium and silicon to steels containing up to 1 or 2 per cent chromium.
"EM" Chromium Briquets (Hexagonal Shape)	Chromium:.....2 lb. Total Weight.....3⅛ lb.	For adding chromium to cast iron in the cupola.
COLUMBIUM ALLOYS		
Ferrocolumbium	Columbium.....50 to 60% Silicon.....max. 8% Carbon.....max. 0.40%	Stabilizer in austenitic chromium-nickel stainless steels. Also constituent of high-temperature alloys.
Ferrotantalum-Columbium	Columbium...approx. 40% Tantalum.....approx. 20% Cb+Ta .....min. 60% Silicon.....5 to 7% Carbon.....max. 0.30%	Stabilizer used to supplement ferrocolumbium in chromium-nickel stainless steels. Also used in high-temperature alloys.
MANGANESE ALLOYS		
Standard Ferromanganese	Manganese.....74 to 76% Carbon.....approx. 7% Silicon.....max. 1%	Most common means of adding manganese to steel for both alloying and deoxidizing purposes. Also for counteracting sulphur in steel and cast iron.
Regular Grade		
Low-Phosphorus Grade	Manganese.....78 to 80% Carbon.....max. 7% Silicon.....max. 2% Phosphorus...max. 0.10%	
Low-Carbon Ferromanganese	Manganese.....min. 90% Carbon.....max. 0.07%	
Low-Phosphorus Grade	Phosphorus...max. 0.06%	
Regular Grades	Manganese.....85 to 90% Carbon..max.0.07,0.10,0.15 0.30, or 0.50%	Additions of manganese to steels of low-carbon specification, particularly stainless steels of 18 per cent chromium, 8 per cent nickel type.
Regular Grade (High-Silicon)	Manganese.....80 to 85% Carbon.....max. 0.75% Silicon..... 5 to 7%	

*All of the alloys and metals listed are produced in the usual lump, crushed, or ground sizes, except where other special forms are indicated.

PRODUCT*	NOMINAL COMPOSITION	USES
MANGANESE ALLOYS cont.		
"Mansiloy" Alloy	Manganese.....60 to 63% Silicon.....28 to 31% Carbon.....max. 0.07% Phosphorus....max. 0.05%	Used in production of stainless steels to reduce metal oxides from the slag back into the bath.
Silicomanganese		
Max. 1.50% Carbon Grade	Manganese.....65 to 68% Silicon.....18 to 20%	A versatile alloy useful as furnace block, deoxidizer, and also for making manganese additions to steel in the ladle or in the furnace.
Max. 2.00% Carbon Grade	Manganese.....65 to 68% Silicon.....15 to 17.50%	
Max. 3.00% Carbon Grade	Manganese.....65 to 68% Silicon.....12 to 14.50%	
Medium-Carbon Ferromanganese	Manganese.....80 to 85% Carbon.....1.25 to 1.50% Silicon, max. 1.00 or 1.50%	For making low- and medium-carbon manganese steel and Hadfield steel.
Low-Iron Ferromanganese	Manganese.....85 to 90% Carbon.....approx. 7.00% Silicon.....max. 3% Iron.....max. 2%	For high manganese additions to certain non-ferrous alloys, particularly aluminum.
Manganese Metal	Manganese...min. 95.50% Carbon.....max. 0.20% Silicon.....max. 1.00% Iron.....max. 2.50%	Used both as deoxidizer and alloy in production of numerous non-ferrous metals and alloys.
"EM" Silicomanganese Briquets (Square Shape)	Manganese.....2 lb. Silicon.....½ lb. Total Weight.....3½ lb.	For adding manganese (with silicon) to cast iron in the cupola.
"EM" Ferromanganese Briquets (Oblong Shape)	Manganese.....2 lb. Total Weight.....3 lb.	For adding manganese (without silicon) to cast iron in the cupola.
SILICON ALLOYS		
50% Ferrosilicon		
Regular Grade	Silicon.....47 to 51%	Deoxidizer for most grades of killed or semi-killed steel. Blocking grade specially sized for maximum efficiency.
Blocking Grade	Silicon.....47 to 51%	
Low-Aluminum Grade	Silicon.....47 to 51% Aluminum.....max. 0.40%	
65% Ferrosilicon		
Regular Grade	Silicon.....65 to 70%	For furnace or ladle addition to steels.
Low-Impurity Grade	Silicon....61.50 to 66.50% Aluminum.....max. 0.50% Total Impurities max. 1.00%	Mainly for production of electrical sheet steel.
75% Ferrosilicon		
Regular Grade	Silicon.....73 to 78%	Deoxidizer and alloy for production of high-silicon spring and electrical sheet steel. Graphitizing inoculant for cast iron.
Low-Aluminum Grade	Silicon.....73 to 78% Aluminum.....max. 0.50%	
85% Ferrosilicon		
Regular Grade	Silicon.....83 to 88%	Enables melter to add higher percentages of silicon without chilling metal in ladle. Graphitizing inoculant for cast iron.
Low-Aluminum Grade	Silicon.....83 to 88% Aluminum.....max. 0.50%	
90% Ferrosilicon		
Regular Grade	Silicon.....92 to 95%	Permits large additions of silicon without harmful chilling effect.
Low-Aluminum Grade	Silicon.....92 to 95% Aluminum.....max. 0.50%	
Silicon Metal		Additions of silicon to non-ferrous metals, particularly aluminum and copper.
Regular Grade	Silicon.....min. 97 or 98% Iron.....max. 1 or 2%	
Purified Grade	Silicon....99.70 to 99.90% Iron.....005 to .015%	For applications in non-ferrous industry requiring silicon of high purity.
Low-Calcium Grade	Silicon.....min. 97% Iron.....max. 1% Calcium.....max. 0.10%	For high-silicon aluminum alloys where calcium is detrimental.
Low-Aluminum Grade	Silicon.....min. 98% Iron.....max. 1% Aluminum.....max. 0.10%	For the production of silicon-copper alloys where aluminum is detrimental.
"SMZ" Alloy	Silicon.....60 to 65% Manganese..... 5 to 7% Zirconium..... 5 to 7%	Particularly strong graphitizing inoculant used in cast iron.
"EM" Silicon Briquets		
Large Size (Cylindrical or Brick-Shape)	Silicon.....2 lb. Total Weight.....5 lb.	For adding silicon to cast iron in the cupola. (Brick-shape briquets are available on pallets.)
Small Size (Cylindrical Shape)	Silicon.....1 lb. Total Weight.....2½ lb.	

"Electromet," "EM," "Mansiloy," "Simplex," "SM," and "SMZ," are trade-marks of Union Carbide and Carbon Corporation.

PRODUCT*	NOMINAL COMPOSITION	USES
SILICON ALLOYS cont.		
Magnesium-Ferrosilicon	Silicon.....43 to 47% Magnesium....7.5 to 9.5%	For ladle addition to cast iron to obtain special properties.
TITANIUM ALLOYS		
Ferrotitanium	Titanium.....27 to 32% Carbon .....max. 0.10%	For stabilized austenitic stainless steels and high-temperature metals.
Silicon-Titanium	Titanium.....40 to 50% Silicon.....45 to 50% Iron.....max. 3%	For additions of titanium to steels or non-ferrous alloys.
Manganese-Nickel-Titanium	Titanium.....43 to 48% Nickel.....approx. 25% Manganese.....max. 8%	Deoxidization of nickel alloys.
TUNGSTEN ALLOYS		
Ferrotungsten	Conforming to A.S.T.M. Spec. A 144-50	For production of tool and die steels; also high-temperature alloys.
Tungsten Metal Powder		Production of tungsten steels and cast tungsten carbide.
Melting Grade	Tungsten.....min. 98.80% Total Carbon..max. 0.25%	
Calcium Tungstate	Tungstic Oxide..68 to 72%	For making tungsten chemicals and other tungsten products.
Calcium Tungstate Nuggets	Tungstic Oxide..68 to 72%	Making tool steels and high-temperature alloys.
Ammonium Paratungstate	Tungstic Oxide..min. 88.7%	Intermediate for tungsten products.
VANADIUM ALLOYS		
Ferrovanadium	Vanadium.....50 to 55% or 70 to 75% Carbon....max. 0.20, 0.50, or 3.00% Silicon....max. 1.50, 2.00, or 8%; and approx. 10%	Production of tool and engineering steels, high-strength structural steels, non-aging rimming steels, and wear-resistant irons.
Vanadium Oxide Fused	V_2O_5.....86 to 89% Na_2O.....approx. 10% CaO.....approx. 2%	For addition of vanadium to steel and for manufacturing catalysts.
Sodium Polyvanadate (Red Cake)	V_2O_5.....approx. 85% Na_2O.....approx. 9%	For manufacture of vanadium compounds, including vanadium catalysts.
High-Purity Ammonium Metavanadate	V_2O_5.....approx. 99.50% NH_4VO_3.....min. 99%	
ZIRCONIUM ALLOYS		
12 to 15% Zirconium Alloy	Zirconium.....12 to 15% Silicon.....39 to 43% Carbon.....max. 0.20%	This is a powerful deoxidizer. It also increases depth of hardening.
35 to 40% Zirconium Alloy	Zirconium.....35 to 40% Silicon.....47 to 52% Carbon.....max. 0.50%	Deoxidizer for fine grades of alloy steels.
Nickel-Zirconium	Zirconium.....25 to 30% Nickel.....40 to 50%	For deoxidizing and degasifying nickel alloys.
"EM" Zirconium Briquets (Cylindrical Shape, Reddish Color)	Zirconium.....0.55 lb. Silicon.....1.90 lb. Total Weight.....5 lb.	For adding zirconium and silicon to cast iron in the cupola.

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Houston 11, Texas.....6119 Harrisburg Boulevard
Los Angeles 58, Calif.....2770 Leonis Boulevard
New York 17, N. Y.....30 East 42nd Street
Pittsburgh 22, Pa.....Oliver Building
San Francisco 6, Calif.....22 Battery Street
In Canada: Electro Metallurgical Company of Canada Limited, Welland, Ontario

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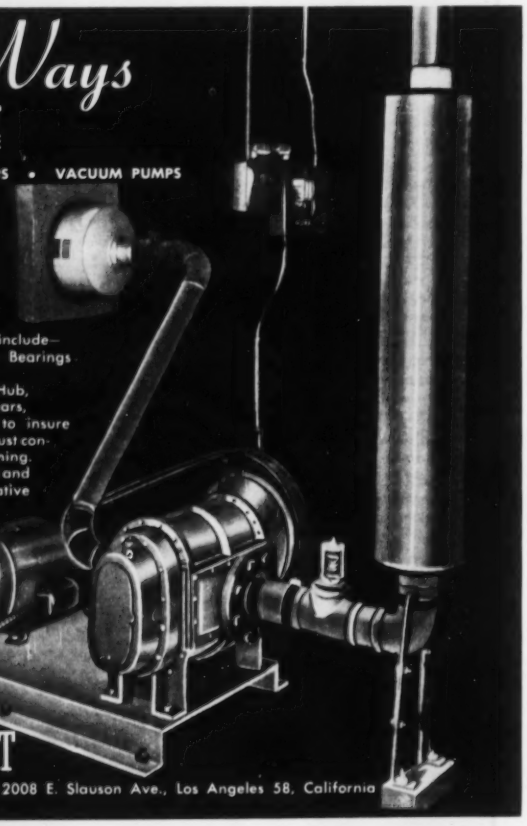

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(*Continued from Page* 479)

troduces a new beryllium-copper alloy called Beryldur at the National Metal Expositon & Congress in Cleveland. Company officials predict it will rival bronze and brass because it carries a lower price tag than other alloys with higher beryllium content.

Oct. 20—Chrysler Corp. will expand facilities in Los Angeles for assembling its automobiles.

Oct. 21—Great Lakes Steel Corp. drops prices on some of its steel to automakers to meet freight absorption by some of its competition.

Oct. 23 — Westinghouse Electric Corp. is selected by the government to be the first to build a full-scale atomic power plant. Initial production is set for 60,000 kilowatts and plant cost will run into the "tens of millions of dollars." Site has not been selected.

NEW DIRECTION FOR ATOMS

. . . civilian uses get "go" sign

Caterpillar Tractor Co. plans to lay off some 2000 workers at Peoria, Ill., because of the "lack of demand for our products."

Machine tool orders declined to $64 million in September from $84.5 million in August.

U. S. Steel Corp. will begin importing iron ore from Venezuela starting early in 1954. Total shipments for the year are expected to reach 2 million tons.

Republic Steel Corp. says it will

increase the stainless steel capacity at its Massillon, O., plant by 20 per cent.

Great Northern Railway Co. directors O.K. an expenditure of $6.1-million for 37 new diesel-electric locomotive units and a large program for track and bridge improvements in 1954.

The 34th National Metal show ended in Cleveland today. Most apparent among the record number of exhibitors was the emphasis on selling for the coming year.

Oct. 21 — Refined copper prices were raised yesterday a half cent a pound at custom smelter level to 29½ cents. Improved demand for October-November delivery is firming prices.

Oct. 24 — The first Hydra-Matic transmission to be assembled since the Livonia fire Aug. 12 is shipped from General Motors Corp.'s Riopelle street plant in Detroit.

Oct. 28—Jones & Laughlin Steel Corp. says it will close temporarily 5 of its 22 open-hearth furnaces and one blast furnace at its Pittsburgh plant about Nov. 1. Reason given: "Market conditions."

Northrop Aircraft Inc., Hawthorne, Calif., officials report an order backlog of $508 million and see no curtailment in the industry through 1954.

Oct. 29—General Motors Corp. rode to new records in the first nine months of 1953 and earned the position of the greatest earner and seller among the world's corporations. Sales hit $7.9 billion and earnings $452 million. Over $1-billion was paid in income taxes.

Chrysler Corp. says that 12 of its 20 new 1954 models to be unveiled soon will carry a lower price tag than comparable 1953 models.

Oct. 23—Chrysler Corp. announces that it will purchase the Briggs Mfg. Co. for $35 million.

NOVEMBER

Nov. 1— Controls on nickel are

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NEW METALWORKING PINNACLE

. . . past production records fall

lifted, but little effects are expected in the market. Defense needs still have priority (this amounts to an estimated 40 per cent of supply), and price change questions are met with a "no comment."

Nov. 2—American Trucking Associations hits the much-publicized "piggy-back" movement for transporting trailers aboard freight cars. They fear subordination to railroads and say traffic congestion relief would be but minor.

Firth Sterling Inc. is installing facilities at its Trafford, Pa., plant for melting and rolling zirconium and zirconium alloys.

More scattered employment reductions reported 'round the country. Companies making layoffs include Youngstown Sheet & Tube Co.; Mullins Mfg. Co., Warren, O.; General Electric at its Auburn, N. Y., plant; RCA Victor Corp., Camden, N. J.; and General Motors Corp., Westinghouse Electric Corp., Republic Brass Co., Lempco Products Co., Weatherhead Co., and Yoder Co., all in Cleveland.

Nov. 3—New blood is pumped into New England's hopes for a steel mill. New England Development Corp. was recently purchased by Ebasco Services, an engineering firm, for "clients in the steel business" and a fast tax write-off certificate to build the $26-million electric mill has been granted by the Office of Defense Mobilization.

Nov. 4—Pentagon Budget Chief W. J. McNeil states that defense

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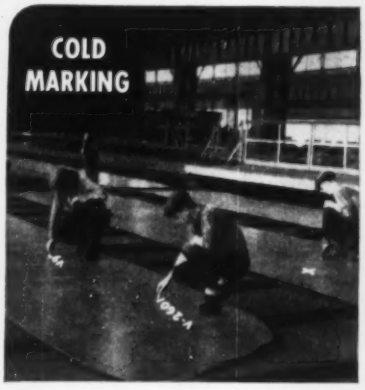

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THE MARK OF QUALITY — MARKAL

spending is still on the upswing but will likely start down in December.

Nov. 5—Unseasonally mild weather this fall is blamed for sharp declines reported by department stores. Dollar volume fell 9 per cent in New York and 12 per cent in Philadelphia last week as compared to 1952.

Government is offering up to 100 per cent fast tax write-off for projects in labor surplus areas in an effort to curb the unemployment upward swing.

The National Lead & Zinc Committee asks the Traffic Commission to recommend new levies on lead and zinc imports. Imports, they charge, threaten serious injury to domestic industry,

Nov. 6—Studebaker Corp. President Harold S. Vance says his firm is planning for a bigger share of the market in 1954, even though the company's new models will carry a higher price tag.

Ford Motor Co. has set up a new division. Trade rumors are that it will resume production of the high-priced "Continental" car.

Nov. 10—General Electric Co. plans to build a new factory for making electric controls near Waynesboro, Va., to meet increasing demands for electronic equipment drives, speed regulators and other controls.

Reconstruction Finance Corp. officials confirm reports that General Motors will purchase Willow Run from Kaiser Motors Corp. for $26 million. Built for the government in 1941, Willow Run originally cost $60 million.

Nov. 11—Westinghouse Electric Corp.'s announced cut in television set prices from $80 to $200 brings speculation about a softening in TV demand. Some in the industry, however, say they plan no immediate price cuts.

Nov. 16—CIO opens its annual convention in Cleveland. More guaranteed wage talk is made and the organization gives cool reception to

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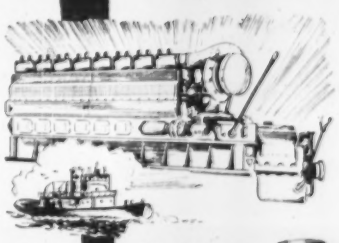

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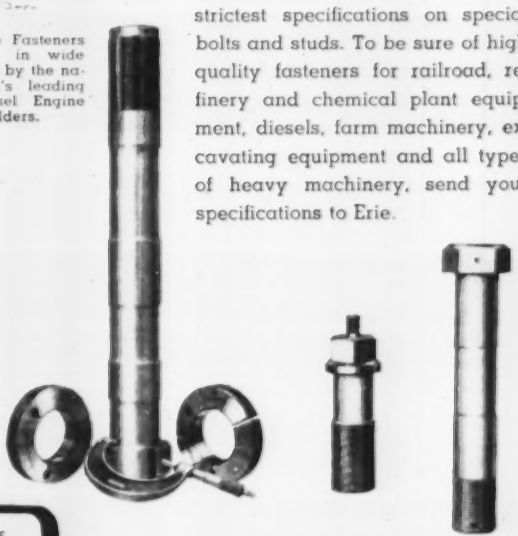

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General Motors Corp. will offer publicly $300 million worth of 25-year debentures for sale on Dec. 9 throughout the nation. The move denotes continued confidence in economic conditions.

Nov. 17—Benjamin Fairless, chairman, U. S. Steel Corp., and David J. McDonald, CIO Steelworkers president, begin their tour of U. S. Steel's plants.

Ore Boats Set Record

Nov. 18—The iron ore fleet is slowing operations of its record ore-carrying season. About 100 of the 200 ships in the fleet have been berthed for the winter. A record 92.7 million tons have come down the lakes already but the 100-million ton goal will probably not be attained.

Nov. 21—Gross tons of iron ore consumed by U. S. and Canadian furnaces hit a new high for the month of October—8.1 million tons.

Nov. 23—Auto Row headache: How to get rid of the estimated 500,000 new cars reported on hand Oct. 31 before the 1954 models are scheduled to hit the showrooms.

Nov. 24—Steel operations are down to 87.6 per cent capacity this week, American Iron & Steel Institute reports.

Nov. 25—Air Force officials speaking before the Senate Interior Subcommittee hearing urge expansion in the titanium industry. The metal is necessary in jet engine construction. Total production in the nation is 2000 tons annually.

Westinghouse Electric Corp. officials say they will meet the increasing competition next year by including cheaper refrigerators and electric stoves in their lines.

Nov. 27— Federal Reserve Board states that the U. S. will produce a record-breaking $368 billion worth of goods and services in 1953. This is equal to $2300 for each man, woman and child in the nation.

A NEW ROLE FOR THE SELLER
. . . as a buyers' market returns

DECEMBER

Dec. 1—Increasing layoffs in the steel industry are causing more talk in CIO circles of pushing for a guaranteed annual wage in next spring's contract talks.

Manufacturers' sales for October were reported slightly above 1952, but new orders dropped sharply, nearly $2 billion less than in October, 1952.

Dec. 2—Defense Secretary Charles E. Wilson says his department's request for money for the fiscal year starting next July will be "somewhat" less than the $34.3-billion appropriated for the current year.

Industrial production indexes dropped in November from the October level, Federal Reserve reports. Its index stood at 228 per cent of the 1935-1939 level.

American Telephone & Telegraph Co. plans to lay the first undersea telephone cable across the Atlantic. It will extend 2300 miles from Nova Scotia to Newfoundland to Scotland. Cost is estimated at $35 million.

Dec. 3—About half of the production of the nation's two largest canmakers was choked off yesterday as 33,000 CIO Steelworkers went on strike. Hit were 29 of the 57 plants of American Can Co. and 32 of the 74 Continental Can Co. plants.

Steel scrap prices continue a decline started two weeks ago and dipped $2 to $3 in Pittsburgh, making the price for No. 1 heavy melting scrap $34 a ton.

Dec. 4—Erie Mining Co. has arranged financing for the initial phase of a program to turn out 10.5 million tons of taconite "pills" annually. The plant will be located near Aurora, Minn.

Firth Sterling Inc., Pittsburgh; American Electro Metal Corp., Yonkers, N. Y., and Carborundum Co., Niagara Falls, N. Y., have formed the Borolite Corp. The new firm will pursue research and development of borolites, a group of metal substances showing promise of withstanding high temperatures.

Dec. 7—U. S. Steel Corp. will cut its Duquesne Works output by nearly 22 per cent. It will discontinue operation of five remaining furnaces of its old No. 1 open-hearth shop on Dec. 24.

Dec. 8—Supreme Court rules that T-H Act in no way sanctions disloyalty. Employees may be fired for deriding a firm or its product.

First reports on the Christmas trade indicate that volume this year will equal or better that of 1952, department store officials across the nation say.

Dec. 9—Oil well drilling, a field which provides a sizable market for metalworking, is running at its highest level in two years.

Kaiser Motors Corp. sells its Jackson, Mich., plant to Walker Mfg. Co., Racine, Wis.

Dec. 11—Factory employment in November dropped to 16.7 million, down 300,000 from October.

Heavy construction awards climbed to $655 million for the week ended Dec. 7, highest for any week of the year.

Dec. 14—After a brief period of pessimism this fall about 1954's business activity, more optimistic predictions for the coming year are being made. Most feel now that business will not decline more than 3 to 5 per cent below 1953.

Vitro Corporations Merge

New organization, Vitro Corp. of America, will have five divisions or operating units

STOCKHOLDERS of Vitro Mfg. Co., New York, ratified a plan of merger and reorganization at a special meeting on Dec. 21. The parent corporation and its two subsidiaries, Vitro Corp. of America and Vitro Chemical Co., will merge into one corporation.

The merged corporation will be known as Vitro Corp. of America, with offices in New York. It will include five divisions or operating units and will retain the same capital structure, directors and officers.

The resulting divisions of the corporation will be Vitro Mfg. Co., Pittsburgh, maker of ceramic colors and chemical products; Vitro Uranium Co., Salt Lake City, Utah, processor of uranium ore; Canonsburg Rare Metals Co., Canonsburg, Pa., engaged in the refining and recovery of metals; Vitro Laboratories, Silver Spring, Md., and West Orange, N. J., engaged in research and development; and Vitro Engineering Division, New York, providing engineering, design and construction management services.

Morse Chain Completes Project

Morse Chain Co., Detroit, a subsidiary of Borg-Warner Corp., Chicago, completed a $1.4-million modernization and expansion program at its power transmission manufacturing plant in Ithaca, N. Y. To provide for expanded chain manufacturing plant facilities at the Ithaca plant, Morse converted a 75,000-sq-ft iron foundry to a punch press and heat treating plant. A new 3420-sq-ft covered addition was built on the former foundry building to provide steel storage facilities.

The company is abandoning all foundry facilities at the Ithaca plant because of decreased industrial demand for cast iron sprockets. Morse now will buy sprocket castings from outside sources.

Heavy emphasis has been placed on cutting production costs in the new plant expansion, says F. M. Hawley, president. New heat treating equipment permits continuous processing of chain components and combines four former individual operations of washing, hardening, tumbling and drawing. Improved materials handling techniques also will cut production costs, Mr. Hawley says.

Machine Tool Firm Expanding

Standard Machine & Tool Co. Ltd., Windsor, Ont., manufacturer of special-purpose machine tools, will make a "considerable" investment in additional machine tool equipment to expand manufacturing operations in its Windsor plant. The firm will build an additional plant near Preston, Ont. Some of the departments of the new plant are expected to be in production by the middle of 1954.

Revere To Install Furnace

Revere Copper and Brass Inc., Baltimore Division, Baltimore, early next year will install a 150,000-lb capacity gas-fired homogenizing furnace in the aluminum section of its Wicomico street plant. This will supplement a 66,000-lb batch-type furnace now in use.

Baker Mfg. To Build Plant

Baker Mfg. Co., Springfield, Ill., manufacturer of snow plows, road-building machinery and earth-moving equipment, awarded a contract to Luria Engineering Co., Bethlehem, Pa., for construction of a 40,000-sq-ft manufacturing plant at Beardstown, Ill. The new property will supplement production at the company's main plant in Springfield where a $1.5-million expansion was completed recently.

Steel & Wire Firm Organized

Gulf Steel & Wire Co. was organized by C. G. Raible, Cleveland, to construct and operate a wire mill in Puerto Rico. The company is building a plant near the town of Bayamon, about ten miles from San Juan. It will have a capacity of 40,000 tons of finished wire products per year. Principal products will be chain, nails, concrete mesh, chain line fencing and galvanized wire. Leroy D. Seymour is supervising the work and will manage the business. The plant is expected to be in full operation by Mar. 1. The company address is 211 Medical Arts Bldg., Stop 3½, San Juan, Puerto Rico.

Harvester To Make Heil Line

International Harvester Co., Chicago, continues its program to round out a full line of equipment in the industrial power and earth-moving industry. The firm has made a contract with Heil Co., Milwaukee, which will enable Harvester to manufacture two-wheel rubber-tired industrial tractors for use in heavy construction work. Under the agreement, Heil will manufacture certain types of scrapers and wagons for Harvester.

Forms U. S. Steel Foundation

Formation of a nonprofit corporation, United States Steel Foundation Inc., was announced by Benjamin F. Fairless, chairman of the board, United States Steel Corp., New York. Mr. Fairless is chairman of the foundation's board of trustees; other trustees are members of the board of United States Steel.

The foundation will have its headquarters at 71 Broadway, New York, and will contribute to the support of exclusively charitable, educational and scientific activities and projects, primarily from grants received by it from U. S. Steel.

Machine Tool Firms To Merge

Lodge & Shipley Co., Cincinnati, producer of lathes and metal turning equipment, will acquire through merger Columbia Machinery & Engineering Corp., Hamilton, O., producer of shears, brakes and presses. Effective date of the merger has not been set.

Olin To Expand Facilities

Olin Industries Inc., East Alton, Ill., will spend $5.5 million for a project which will expand the fabbricating facilities of its Metals Division. Products which will be manufactured in this plant will require the use of aluminum and copper-base alloys. The new fabricating facility at East Alton should not be confused with Olin's

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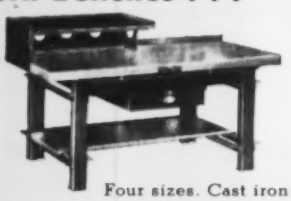

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entrance into the aluminum industry at a site not yet determined.

Orban Forms Canadian Unit

Kurt Orban Co. Inc., New York, formed a Canadian affiliate, Kurt Orban Canada Ltd., for the distribution of metals, machine tools, dry kilns and steel mill products imported from Germany. Gunther Kneidel is commercial manager of the Canadian firm. Offices are located at 2490 Eglington Ave., W., Toronto, Ont.

Porter To Expand Division

H. K. Porter Co. Inc.'s Watson-Stillman Fittings Division, Roselle, N. J., announces a $250,000 expansion program. The project includes additional land, buildings and installation of specially designed automatic machine tools for increased production of forged steel fittings.

Milburn Expands Product Line

Alexander Milburn Inc., Baltimore, oxyacetylene cutting and welding products, recently expanded its line to include special electronic control systems allied to the oxyacetylene lines, etc. W. L. Lawrence is president.

Seattle Firms May Merge

Lang & Co. and Ravenna Metal Products Co., Seattle, plan to merge. The former firm recently acquired a sheet metal plant in that city to produce restaurant equipment for its food processing business. Ravenna Metal makes single-handle mixing faucets. If stockholders approve the merger, a plant will be opened at an undisclosed location in Ohio.

Ducommun Buys Phoenix Firm

Ducommun Metals & Supply Co., Los Angeles, acquired the inventory, equipment and organization of Industrial Supply Co., Phoenix, Ariz., an affiliate of Rawlins Bros. Inc., a Los Angeles steel and industrial materials firm. Industrial Supply Co. will be operated as Ducommun Metals & Supply Co.—Arizona Division. Chester C. Cooper was named manager of the division. Ducommun Metals is building a $700,000 plant in National City, Calif., to serve customers in the San Diego area.

Scholtes & Keller Move

Scholtes & Keller Metal Products Co., Baltimore, moved into larger space at 530 Reisterstown Rd., that city.

Galion To Make Loaders

Galion Allsteel Body Co., Galion, O., acquired sales and manufacturing rights to the line of tractor loaders patented and built by John Austin Mfg. Co., Denver. All Austin activities will be moved to the new owner's plants in Galion and Mansfield, O.

Uhrden Opens Detroit Branch

Uhrden Inc., Dennison, O., opened a factory sales and service branch at 18509 James Couzens Highway, Detroit, under managership of Chester L. Jackson. The firm makes materials handling equipment.

Insul-Mastic Names Agent

Insul-Mastic Corp. of America, Pittsburgh, appointed Robert Lear & Son, Louisville, as its representative in that territory. Insul-Mastic makes heavy, pressure-applied, asphaltic-type coatings.

Follansbee Makes Appointment

Follansbee Steel Corp., Pittsburgh, named R. Wilbur Martindale to be purchasing agent for its warehouse in Fairfield, Conn. A new warehouse building is being erected in Wallingford, Conn., and is scheduled for completion in June, 1954. It will cost $750,000 and will cover 54,000 sq ft, or more than three times the size of the present Fairfield building. The Wallingford warehouse will handle cold-rolled and hot-rolled steel products. It also will sell Follansbee's mill products, which include cold-rolled strip steel, polished blue steel and seamless terne metal roofing, as well as products of the firm's Sheet Metal Specialty Division, such as stove pipe, furnace pipe and dairyware.

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SEATTLE, WASH.

LEADERS IN IRON AND STEEL SCRAP SINCE 1889

STEEL

January 4, 1954

Market Outlook

THE YEAR just starting to unfold should bring the second-best year in metalworking. That's the belief expressed in a poll STEEL made among more than 5000 top executives.

Volume of sales would total $124 billion, only 2 per cent below the record $126.6 billion rung up in 1953.

SOMETHING NEW—Although that outlook suggests heavy requirements in 1954 for metals, the new year arrived amid the lightest demand for a long while.

Never before has the steel industry been in such a good position to fulfill demand. Its capacity is the largest ever—approximately 120 million net tons of steel for ingots and castings, compared with 117.5 million a year ago.

A CUT IN CAPACITY?—Now that the steel industry has caught up with and overtaken demand, it's possible the steelmaking capacity may be cut down from its record high of around 120 million tons. At least 5 million tons of this capacity, and perhaps as much as 10 million tons, represent marginal high-cost facilities which can be operated only in time of peak demand, Bennett S. Chapple Jr., assistant executive vice president of the commercial division, U. S. Steel Corp., estimates. Some of this high-cost capacity has been kept intact only because it was needed until the latter part of 1953. How much will be eliminated? Early in 1953, Joseph L. Block, executive vice president, Inland Steel Co., predicted that obsolete capacity that would be dismantled in the United States in the next two years would not exceed 1 million tons.

ONLY A PAUSE—Any reduction in capacity probably would be only temporary. The country's population and standard of living are growing and for some time we'll have a defense program. These suggest the long-range trend of steel needs will be upward.

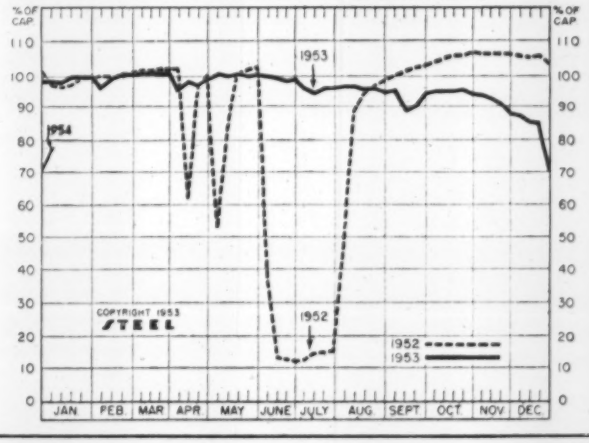
With a record-breaking capacity, the steel industry was able in 1953 to set a new production record of approximately 112.3 million net tons of steel for ingots and castings. Previous record was made in 1951, with 93,168,039 tons.

WORLD OF RECORDS—The new production record in the United States, along with new records in a number of other countries, brought about a record world output of approximately 256,385,000 net tons of steel for ingots and castings. The previous record had been set in 1952, with 231,304,149 net tons. Largest producer in 1953 was, of course, the United States. Second, but far down the scale, was Russia, with an estimated production of 41.8 million tons.

THE BIG THREE—Through 1953, the three biggest customers of the steel industry continued to be the automobile plants, distributors, and the construction industry.

While the rate of steel production at the end of 1953 was the lowest of the year, the rate of steel consumption then was not as low as the steel production rate might suggest. Knowing that steel deliveries had improved markedly, users were living off steel inventories they had built for protection when steel was hard to get. As soon as they work off these stocks, consumers are expected to come back into the market with new orders. However, enough pressure has been lifted from demand to suggest that price concessions will continue to be made on steel this year.

NATIONAL STEELWORKS OPERATIONS



DISTRICT INGOT RATES

(Percentage of capacity engaged at leading production points)

	Week Ended Jan. 2	Change	Same Week 1953	Same Week 1952
Pittsburgh	81	+ 5.5*	103	98
Chicago	87	+ 13	106.5	99.5
Mid-Atlantic	84	+ 13	100	101.5
Youngstown	75	+ 15	106	106
Wheeling	88	0*	100.5	102
Cleveland	52.5	— 0.5*	99.5	99
Buffalo	55	+ 6	106.5	104
Birmingham	80	0	108	104
New England	73	— 3	90	89
Cincinnati	67.5	0	70	102
St. Louis	83	+ 19	88.5	58.5
Detroit	93.5	+ 26	107	106
Western	86	0	108	102
Estimated National Rate	75†	+ 11*	98.5	97

*Change from preceding week's revised rate.
†Preliminary.

Weekly steelmaking capacity is estimated at 2,254,459 net tons in 1953 and 1954; 2,077,040 tons in 1952.

PRICE INDEXES AND COMPOSITES

AVERAGE PRICES OF STEEL (Bureau of Labor Statistics) Week Ended Dec. 29

Prices include mill base prices and typical extras and deductions. Units are 100 lb except where otherwise noted in parentheses. For complete description of the following products and extras and deductions applicable to them write to STEEL.

Rails, standard, No. 1	$4.400	Bars, H.R., alloy	$8.675	Strip, C.R., stainless, 430 (lb)	$0.415	Tin plate, hot-dipped, 1.25 lb	$8.433
Rails, light, 40 lb	5.767	Bars, H.R., stainless, 303 (lb)	0.418	Strip, H.R., carbon	4.975	Tin plate, electrolytic, 0.25 lb	7.133
Tie Plates	5.125	Bars, H.R., carbon	4.873	Pipe, black, buttweld (100 ft)	14.454	Black plate, can making quality	6.233
Axles, railway	7.250	Bars, reinforcing	4.750	Pipe, galv., buttweld (100 ft)	17.731	Wire, drawn, carbon	7.713
Wheels, freight car, 33 in. (per wheel)	47.000	Bars, C.F., carbon	7.860	Pipe, line (100 ft)	141.960	Wire, drawn, stainless, 430 (lb)	0.545
Plates, carbon	4.550	Bars, C.F., alloy	11.075	Casing, oil well, carbon (100 ft)	149.516	Bale ties (bundle)	5.653
Structural Shapes	4.383	Bars, C.F., stainless, 302 (lb)	0.433	Casing, oil well, alloy (100 ft)	214.113	Nails, wire, 8d common	7.488
Bars, tool steel, carbon (lb)	0.415	Sheets, H.R., carbon	4.765	Tubes, boiler (100 ft)	‡	Wire, barbed (80-rod spool)	6.847
Bars, tool steel, alloy, oil hardening die (lb)	0.505	Sheets, C.R., carbon	5.904	Tubing, mechanical, carbon (100 ft)	‡	Woven wire fence (20-rod roll)	16.174
Bars, tool steel, H.R. alloy, high speed W 6.75, Cr 4.5, V 2.1, Mo 5.5, C 0.60 (lb)	1.135	Sheets, galvanized	6.945	Tubing, mechanical, stainless, 304 (100 ft)	161.193		
Bars, tool steel, H.R., alloy, high speed W 18, Cr 4, V 1 (lb)	1.730	Sheets, C.R., stainless, 302 (lb)	0.548				
		Sheets, electrical	9.183				
		Strip, C.R., carbon	7.243				

‡ Not available.

FINISHED STEEL PRICE INDEX (Bureau of Labor Statistics)

	Dec. 29 1953	Dec. 22 1953	Month Ago	Nov. Average
(1947-1949=100)	141.5	141.5	141.4	141.4

STEEL's FINISHED STEEL PRICE INDEX

	Dec. 31 1953	Week Ago	Month Ago	Year Ago	5 Yrs. Ago
Index (1935-39 av.=100)	189.74	189.74	189.91	181.31	151.86
Index in cents per lb	5.140	5.140	5.145	4.912	4.114

STEEL's ARITHMETICAL PRICE COMPOSITE*

	Dec. 31 1953	Week Ago	Month Ago	Year Ago	5 Yrs. Ago
Finished Steel, NT	$114.64	$114.64	$115.18	$110.98	$95.50
No. 2 Fdry, Pig Iron, GT	56.54	56.54	56.54	55.04	46.69
Basic Pig Iron, GT	56.04	56.04	56.04	54.66	46.29
Malleable Pig Iron, GT	57.27	57.27	57.27	55.77	47.41
Steelmaking Scrap, GT	31.33	31.33	34.33	43.00	43.25

*For explanation of weighted index see STEEL, Sept. 19, 1949, p. 54; of arithmetical price composite, STEEL, Sept. 1, 1952, p. 130.

COMPARISON OF PRICES

Comparative prices by districts, in cents per pound except as otherwise noted. Delivered prices based on nearest production point.

FINISHED STEEL	Dec. 31 1953	Week Ago	Month Ago	Year Ago	5 Yrs. Ago
Bars, H.R., Pittsburgh	4.15	4.15	4.15	3.95	3.45
Bars, H.R., Chicago	4.15	4.15	4.15	3.95	3.35
Bars, H.R., del. Philadelphia	5.302	5.302	5.302	4.502	3.70
Bars, C.F., Pittsburgh	5.20	5.20	5.20	4.925	3.95
Shapes, Std., Pittsburgh	4.10	4.10	4.10	3.85	3.275
Shapes, Std., Chicago	4.10	4.10	4.10	3.85	3.25
Shapes, deld., Philadelphia	4.38	4.38	4.38	4.13	3.48
Plates, Pittsburgh	4.10	4.10	4.10	3.90	3.50
Plates, Chicago	4.10	4.10	4.10	3.90	3.40
Plates, Coatesville, Pa.	4.35	4.35	4.35	4.35	3.75
Plates, Sparrows Point, Md.	4.10	4.10	4.10	3.90	3.45
Plates, Claymont, Del.	4.55	4.55	4.55	4.35	3.95
Sheets, H.R., Pittsburgh	3.925	3.925	3.925	3.775	3.275
Sheets, H.R., Chicago	3.925	3.925	3.925	3.775	3.25
Sheets, C.R., Pittsburgh	4.775	4.775	4.775	4.575	4.00
Sheets, C.R., Chicago	4.775	4.775	4.775	4.575	4.00
Sheets, C.R., Detroit	4.975	4.975	4.975	4.775	4.20
Sheets, Galv., Pittsburgh	5.275	5.275	5.275	5.075	4.40
Strip, H.R., Pitts.	4.425	4.425	4.425	3.75-4.225	3.275
Strip, H.R., Chicago	3.925	3.925	3.925	3.725	3.25
Strip, C.R., Pittsburgh	5.45	5.45	5.45-5.95	5.10-5.80	4.375
Strip, C.R., Chicago	5.70	5.70	5.70	5.35	4.60
Strip, C.R., Detroit	5.45-6.05	5.45-6.05	5.45-6.05	5.30-6.05	4.20
Wire, Basic, Pitts.	5.525	5.525	5.525	5.10-5.225	4.325
Nails, Wire, Pittsburgh	6.55	6.55	6.55	6.20-6.85	5.775
Tin plate (1.50 lb), box, Pitts.	$8.95	$8.95	$8.95	$8.95	$6.70

SEMIFINISHED STEEL					
Billets, forging, Pitts. (NT)	$75.50	$75.50	$75.50	$70.50	$61.00
Wire rods, $\frac{7}{32}$-$\frac{9}{16}$", Pitts.	4.525	4.525	4.525	4.425	3.775

PIG IRON, Gross Ton	Dec. 31 1953	Week Ago	Month Ago	Year Ago	5 Yrs. Ago
Bessemer, Pitts.	$57.00	$57.00	$57.00	$55.50	$47.00
Basic, Valley	56.00	56.00	56.00	54.50	46.00
Basic, deld. Phila.	60.75	60.75	60.75	59.25	50.17
No. 2 Fdry, Pitts.	56.50	56.50	56.50	55.00	46.50
No. 2 Fdry, Chicago	56.50	56.50	56.50	55.00	46.25
No. 2 Fdry, Valley	56.50	56.50	56.50	55.00	46.50
No. 2 Fdry, deld. Phila.	61.25	61.25	61.25	59.75	50.67
No. 2 Fdry, Birm.	52.88	52.88	52.88	51.38	43.38
No. 2 Fdry (Birm.) del. Cin.	60.43	60.43	60.43	58.93	49.09
Malleable, Valley	56.50	56.50	56.50	55.00	46.50
Malleable, Chicago	56.50	56.50	56.50	55.00	46.50
Ferromanganese, Duquesne	200.00†	200.00†	200.00†	228.00*	163.00*

*78-82% Mn, per gross ton, Etna, Pa. †74-76% Mn, per net ton.

SCRAP, Gross Ton (Including broker's commission)					
No. 1 Heavy Melt, Pitts.	$32.50	$32.50	$34.50	$44.00	$42.73
No. 1 Heavy Melt, E. Pa.	29.50	31.00	35.00	41.50	45.25
No. 1 Heavy Melt, Chicago	30.50	30.50	33.50	42.50	41.75
No. 1 Heavy Melt, Valley	29.50	29.50	33.50	44.00	42.75
No. 1 Heavy Melt, Cleve.	28.50	29.50	31.50	43.00	42.25
No. 1 Heavy Melt, Buffalo	28.50	29.50	32.50	43.00	48.50
Rails, Rerolling, Chicago	42.50	42.50	46.00	52.50	69.50
No. 1 Cast, Chicago	32.50	33.50	34.50	45.00	70.50

COKE, Net Ton					
Beehive, Furn, Connlsvl.	$14.75	$14.75	$14.75	$14.75	$14.50
Beehive, Fdry, Connlsvl.	16.75	16.75	16.75	17.00	17.00
Oven Fdry, Chicago	24.50	24.50	24.50	24.50	20.40

NONFERROUS METALS

(Cents per pound, carlots, except as otherwise noted)

PRIMARY METALS AND ALLOYS

Aluminum: 99+%, ingots 21.50, pigs 20.00, 10,000 lb or more, f.o.b. shipping point. Freight allowed on 500 lb or more.

Aluminum Alloy: No. 13, 12% Si, 23.30; No. 43, 5% Si, 23.10; No. 142, 4% Cu, 24.40; No. 195, 4.5% Cu, 0.8% Si, 23.70; No. 214, 3.8% Mg, 24.40; No. 356, 7% Si, 0.3% Mg, 23.20.

Antimony: R.M.M. brand, 99.5% 28.50, Lone Star brand, 29.00, f.o.b. Laredo, Texas, in bulk. Foreign brands, 99.5%, 25.50-26.00 New York, duty paid, 10,000 lb or more.

Beryllium: 97%, lump or beads, $71.50 per lb f.o.b. Cleveland or Reading, Pa.

Beryllium Aluminum: 5% Be, $72.75 per lb of contained Be, f.o.b. Reading, Pa.

Beryllium Copper: 3.75-4.25% Be, $40.00 per lb of contained Be, with balance as Cu at market price on shipment date, f.o.b. Reading, Pa. or Elmore, O.

Bismuth: $2.25 per lb, ton lots.

Cadmium: Sticks and bars, $2.00 per lb deld.

Cobalt: 97-99%, $2.60 per lb for 550 lb keg, $2.62 per lb for 100 lb case; $2.67 per lb under 100 lb.

Columbium: Powder, $75.00 per lb, nom.

Copper: Electrolytic 29.50-30.00 deld. Conn Valley, 29.625-30.125 deld. Midwest; Lake 30.00 deld; Fire refined 29.75 deld.

Germanium: 99.9%, $295 per lb nom.

Gold: U. S. Treasury, $35 per oz.

Indium: 99.9%, $2.25 per troy oz.

Iridium: $165-$175 per troy oz.

Lead: Common 13.30, chemical 13.40, corroding 13.40, St. Louis, New York basis, add 0.20.

Lithium: 98%, $11-$14 per lb, depending on quantity.

Magnesium: 99.8% standard ingots 27.00, 10,000 lb or more, f.o.b. Freeport, Tex. Sticks, 1.3 in. dia., 45.00, 100 to 1999 lb.

Magnesium Alloys: AZ91B 30.50; AZ91C and alloys C, H, G and R 32.50; alloy M 34.50, 10,000 lb or more.

DAILY NONFERROUS PRICE RECORD

	Price Dec. 31	Change	Previous Price	Nov. Avg.	Oct. Avg.	Dec. 1952 Avg.
Copper	29.50-30.00	Oct. 20	29.00-30.00	29.750	29.606	24.500
Lead	13.30	Sept. 16	13.80	13.300	13.300	13.925
Zinc	10.00	Sept. 11	10.50	10.000	10.000	12.500
Tin	84.50	Dec. 28	84.25	83.352	81.096	121.500
Nickel	60.00	Jan. 14	56.50	60.000	60.000	56.500
Aluminum	21.50	July 15	20.50	21.500	21.500	20.000
Magnesium	27.00	Mar. 9	24.50	27.000	27.000	24.500

Quotations in cents per pound based on: Copper, deld. Conn. Valley; Lead, common grade, deld. St. Louis; Zinc, prime western, E. St. Louis; Tin, Straits, deld. New York; Nickel, electrolytic cathodes, 99.9%, base size at refinery unpacked; Aluminum, primary ingots, 99+%, deld.; Magnesium 99.8%, Freeport, Tex.

Mercury: Open market, spot, New York, $185-$188 per 76-lb flask.

Molybdenum: Powder 99% hydrogen reduced $3.40 per lb; pressed ingot $4.06 per lb; sintered ingot $5.53 per lb.

Nickel: Electrolytic cathodes, sheets (4 x 4 in. and larger), unpacked, 60.00; 25-lb pigs 62.65; "XX" nickel shot 63.65; "F" nickel shot or ingots for addition to cast iron, 60.00; prices f.o.b. Port Colborne, Ont., including import duty. New York basis, add 0.92.

Osmium: $140-$150 per troy oz. nom.

Palladium: $22-$24 per troy oz.

Platinum: $91-$93 per troy oz. from refineries.

Radium: $16-$21.50 per mg radium content, depending on quantity.

Rhodium: $125 per troy oz.

Ruthenium: $75-$80 per troy oz.

Selenium: 99.5%, $4.25-$4.75 per lb.

Sodium: 16.50, carlots; 17.00 l.c.l.

Tantalum: Sheet, rod $39.00 per lb; powder $33.50 per lb.

Tellurium: $1.75 per lb.

Thallium: $12.50 per lb.

Tin: Straits, New York, 84.50.

Titanium: Sponge, 99.3+ %, $5 per lb.

Tungsten: Powder, 98.8%, carbon reduced, 1000 lb lots $5.35 per lb f.o.b. shipping point; less than 1000 lb $5.50; 99+% hydrogen reduced, $6.30. Treated ingots $10.43.

Zinc: Prime western 10.00, brass special 10.25, intermediate 10.50, E. St. Louis, freight allowed over 0.50 per pound. High grade 11.35, special high grade 11.50, die casting alloy ingot 14.50, deld.

Zirconium: Sponge $14.00 per lb; powder 100 lb or more $7.00; less than 100 lb $8.00. (Note: Chromium, manganese and silicon metals are listed in ferroalloy section.)

SECONDARY METALS AND ALLOYS

Aluminum Ingot: Piston Alloys 20.75-21.75; No. 12 foundry alloy (No. 2 grade) 19.75-20.75; 5% silicon alloy, 0.60 Cu max., 22.75-23.50; 13 alloy, 0.60 Cu max., 22.75-23.50; 195 alloy 21.50-22.50; 108 alloy 20.75-21.75; steel deoxidizing grades, notch bars, granulated or shot: Grade 1, 21.00-22.00; grade 2, 20.00-21.00; grade 3, 18.75-19.75; grade 4, 17.25-18.25.

Brass Ingot: Red brass, No. 115, 24.50; tin bronze No. 225, 35.25, No. 245, 29.50; high-leaded tin bronze, No. 305, 28.75; No. 1 yellow, No. 405, 20.75; manganese bronze No. 421, 25.25.

Magnesium Alloy Ingot: AZ63A, 31.50; AZ91B, 31.50; AZ91C, 32.00; AZ92A, 31.50.

NONFERROUS MILL PRODUCTS

COPPER WIRE

Bare, soft, f.o.b. eastern mills, 100,000 lb lots, 35.36; 30,000 lb lots, 35.48; l.c.l. 35.98. Weatherproof, 100,000 lb 36.28; 30,000 lb, 36.53; l.c.l., 37.03. Magnet wire deld., 15,000 lb or more 41.83; l.c.l., 42.58.

LEAD

(Prices to jobbers f.o.b. Buffalo, Cleveland, Pittsburgh.) Sheets, full rolls, 140 sq ft or more $18.50 per cwt; pipe, full coils $18.50 per cwt; traps and bends, list prices plus 30%.

TITANIUM

(Prices per lb, 100,000 lb and over, f.o.b. mill). Sheets, $15; sheared mill plate, $12; strip, $15; wire, $10; forging billets, $6; hot-rolled and forged bars, $6.

ZINC

Sheets 23.00, f.o.b. mill, 36,000 lb and over. Ribbon zinc in coils, 19.50-20.50, f.o.b. mill, 36,000 lb and over. Plates 19.00-22.25.

NICKEL, MONEL, INCONEL

	"A" Nickel	Monel	Inconel
Sheet, C.R.	86.5	67.5	92.5
Strip, C.R.	92.5	70.5	98.5
Plate, H.R.	84.5	66.5	90.5
Rod, Shapes	82.5	65.5	88.5
Seamless Tubes	115.5	100.5	137.5
Shot, Blocks	....	60.0	....

ALUMINUM

(30,000 lb base; freight allowed over 499 lb)
Sheets and Circles: 2S and 3S mill finish c.l.

Thickness Range, Inches	Widths or Diameters, In., Inc.	Flat Sheet*	Coiled Sheet	Coiled Sheet Circle†
0.249-0.136	12-48	33.9	...	...
0.135-0.096	12-48	34.4	...	...
0.095-0.077	12-48	35.1	32.7	37.5
0.076-0.061	12-48	35.7	32.9	37.7
0.060-0.048	12-48	36.1	33.2	38.1
0.047-0.038	12-48	36.6	33.6	38.4
0.037-0.030	12-48	37.0	34.0	39.1
0.029-0.024	12-48	37.6	34.3	39.6
0.023-0.019	12-36	38.3	35.1	40.4
0.018-0.017	12-36	39.1	35.7	41.3
0.016-0.015	12-36	40.0	36.5	42.5
0.014	12-24	41.0	37.5	43.8
0.013-0.012	12-24	42.1	38.2	44.8
0.011	12-24	43.1	39.4	46.4
0.010-0.0095	12-24	44.3	40.5	48.0
0.009-0.0085	12-24	45.6	41.9	50.0
0.008-0.0075	12-24	47.1	43.1	51.8
0.007	12-18	48.6	44.6	54.1
0.006	12-18	50.2	46.0	59.1

* 72-180 in. lengths. † 26 in. max. dia.

ALUMINUM

Plates and Circles: Thickness 0.250-3.0 in., 24-60 in. widths or dia., 72-240 in. lengths.

Alloy	Plate Base	Circle Base
2S-F, 3S-F	32.4	36.3
50S-F	33.5	37.4
4S-F	34.5	39.1
52S-F	36.2	40.9
61S-T6	37.4	41.5
24S-T4*	39.3	45.4
75S-T6*	47.1	53.7

* 24-48 in. widths or dia., 72-180 in. lengths.

ALUMINUM

Screw Machine Stock: 5000 lb and over.

Dia. (in.) or across flats	—Round— 11S-T3	17S-T4	—Hexagonal— 11S-T3	17S-T4
Drawn				
0.125	59.6	57.9	...	...
0.156-0.172	50.6	48.9	...	...
0.188	50.6	48.9	...	62.4
0.219-0.234	47.9	46.2	...	...
0.250-0.281	47.9	46.2	...	59.5
0.313	47.9	46.2	...	56.8
Cold-finished				
0.375-0.531	46.6	44.9	56.2	53.4
0.563-0.688	46.6	44.9	53.4	50.2
0.750-1.000	45.5	43.8	48.9	47.3
1.063	45.5	43.8	...	45.7
1.125-1.500	43.8	42.1	47.3	45.7
Rolled				
1.563	42.7	41.0	...	...
1.625-2.000	42.1	40.4	...	44.1
2.125-2.500	41.1	39.4	...	...
2.750-3.375	39.9	38.2	...	...

ALUMINUM

Forging Stock: Round, Class 1, 42.05-32.76, in specific lengths 36-144 in., diameters 0.375-8 in.; rectangles and squares, Class 1, 49.2 to 37.6 in random lengths 0.375-4.0 in. thick, widths 0.750-10.0 in.

Pipe: A.S.A. Schedule 40, alloy 63S-T6, 20 ft length, plain ends, 90,000 lb base, per 100 ft.

Nom. pipe size, in.		Nom. pipe size, in.	
¾	$15.05	2	$ 46.30
1	23.65	4	127.70
1¼	32.00	6	228.50
1½	38.25	8	343.80

MAGNESIUM

Sheet: AZ31, commercial grade, 0.032-in. 108.00, 0.064-in. 81.00, 0.125-in. 71.00, 30,000 lb and over, f.o.b. mill.

Plate: Hot-rolled, AZ31, 53.00, 20,000 lb or more 0.188-1.0 in. thick, widths to 48 in., lengths to 144 in.; raise;d pattern floor plate, 69.00, 20,000 lb or more, ¼-in. thick, widths 24-48 in., lengths 60-144 in.

Extrusion Stock: AZ31, Rectangles, ¼ x 2 in. 69.20, 1 x 4 in. 63.00. Rod, 1 in. 66.00, 2 in. 62.50. Tubing, 1 in. OD x 0.065-in. 87.00. Angles, 1 x 1 x ⅛-in. 72.90, 2 x 2 x ¼-in. 67.00. Channels, 5 in. 67.80. I-Beams, 5 in. 66.20.

BRASS MILL PRICES

	MILL PRODUCTS a				SCRAP ALLOWANCES f		
	Sheet, Strip, Plate	Rod	Wire	Seamless Tube	Clean Heavy	Rod Ends	Clean Turnings
Copper	48.38b	45.98c	....	48.44	26.000	26.000	26.250
Yellow Brass	41.72	41.66	42.26	44.63	19.750	19.500	18.000
Red Brass, 85%	45.44	45.38	45.98	48.25	23.000	22.750	22.250
Low Brass, 80%	44.47	44.41	45.01	47.28	22.125	21.875	21.375
Naval Brass	45.76	40.07	52.80	48.92	18.250	18.000	17.500
Commercial Bronze, 90%	46.95	46.89	47.49	49.51	23.875	23.625	23.125
Nickel Silver, 10%	55.36	59.43g	57.69	....	23.625	23.375	11.813
Phosphor Bronze, A, 5%	66.58	67.08	67.08	68.23	26.125	25.875	24.875
Silicon Bronze	52.71	51.90	52.75	70.11e	25.125	24.875	24.125
Manganese Bronze	49.48	43.62	54.06	....	18.250	18.000	17.500
Muntz Metal	43.96	39.77	....	....	18.625	18.375	17.875

a. Cents per lb, f.o.b. mill; freight allowed on 500 lb or more. b. Hot-rolled. c. Cold-drawn. d. Free cutting. e. 3% silicon. f. Prices in cents per lb for less than 20,000 pounds, f.o.b. shipping point. On lots over 20,000 lb at one time, of any or all kinds of scrap, add 1 cent per lb. g. Leaded.

NONFERROUS SCRAP

DEALERS' BUYING PRICES

(Cents per pound, New York, in ton lots)

Aluminum: 2S clipping 13.50; low copper clippings 13.50; mixed clippings 10.50; old sheet 10.50; borings and turnings 7.00; pistons and struts 7.50; crankcases 10.50; industrial castings 10.50.

Copper and Brass: Heavy copper and wire, No. 1 23.00-23.50; No. 2 copper 21.00-21.50; light copper 19.00-19.50; No. 1 composition red brass 17.00; No. 1 composition turnings 16.50; mixed brass turnings 10.50; new brass clippings 17.00-17.50; No. 1 brass rod turnings 12.00-12.50; light brass 10.00; heavy yellow brass 12.50-13.00; new brass rod ends 14.50; auto radiators, unsweated, 12.50; cocks and faucets 14.50-15.00; brass pipe 16.00.

Lead: Heavy 10.50; battery plate 5.50-5.75; linotype and stereotype 12.50; electrotype 11.00; mixed babbitt 12.00-12.50.

Magnesium: Clippings 20.00-21.00; clean castings 19.00-20.00; iron castings, not over 10% removable Fe, 18.00-19.00.

Monel: Clippings 24.00-26.00; old sheet 22.00-24.00; turnings 18.00-20.00; rods 24.00-26.00.

Nickel: Sheets and clips 70.00; rolled anodes 70.00; turnings 40.00; rod ends 70.00.

Tin: No. 1 pewter 40.00-45.00; block tin pipe 65.00-67.00; No. 1 babbitt 37.00-38.00.

Zinc: Old zinc, 3.50; new die cast scrap, 3.50; old die cast scrap, 3.25.

REFINERS' BUYING PRICES

(Cents per pound, carlots, delivered refinery)

Aluminum: 2S, 3S clippings 14.00-14.50; 51S, 52S clippings 14.00-14.50; 14S, 17S, 24S clippings 13.00-13.50; mixed clippings 12.75-13.50; old sheet 11.00-11.50; old cast 11.00-11.50; clean old cable, free of steel, 14.00-14.50; borings and turnings 11.50-12.00.

Beryllium Copper: Heavy scrap, 0.020-in. and heavier, not less than 1.5% Be, 42.00; light scrap 37.00.

Copper, Brass: No. 1 copper 24.00-24.50; No. 2 copper 22.50; light copper 21.00; refinery brass (60% copper) per dry copper content 19.50; auto radiators, nominal.

INGOT MAKERS' BUYING PRICES

(Cents per pound, carlots, delivered)

Copper, Brass: No. 1 copper 25.00; No. 2 copper 23.50; light copper 22.00; No. 1 composition borings 18.00-18.50; No. 1 composition solids 18.50-19.00; heavy yellow brass solids 14.00-14.50; yellow brass turnings 12.75-13.25; radiators 14.00-14.50.

PLATING MATERIALS

(F.o.b. shipping points, freight allowed on quantities)

ANODES

Cadmium: Special or patented shapes $2.15 per lb.

Copper: Flat-rolled 45.04, oval 44.54, 2000-5000 lb; electrodeposited 39.78, cast 42.04, 5000-10,000 lb lots.

Nickel: Depolarized, less than 500 lb 92.00; 500-4999 lb 88.00; over 5000 lb 86.00.

Tin: Bar or slab, less than 200 lb $1.035; 200-499 lb $1.02; 500-999 lb $1.015; 1000 lb or more $1.01.

Zinc: Bar 18.50, bar or flat top 17.50, ton lots.

CHEMICALS

Cadmium Oxide: $2.15 per lb, in 100 lb drums.

Chromic Acid: Less than 2000 lb 29.00; over 2000 lb 28.75.

Copper Cyanide: Under 1000 lb 63.90, 1000 lb and over 61.90.

Copper Sulphate: 100-6000 lb 11.35; 6000-12,000 lb 11.10; 12,000-24,000 lb 10.85; 24,000-36,000 lb 10.60; 36,000 lb and over 10.35.

Nickel Chloride: 100 lb 45.00; 200 lb 43.00; 300 lb 42.00; 400-4900 lb 40.00; 5000-9900 lb 38.00; 10,000 lb and over 37.00.

Nickel Sulphate: 100 lb 37.00; 200 lb 35.00; 300 lb 34.00; 400-4900 lb 32.00; 5000-35,000 lb 30.00; 36,000 lb and over 29.00.

Silver Cyanide: Cents per ounce, 16 oz 80.625; 100 oz 78.50; 2500 oz and over 77.375.

Sodium Cyanide: Egg, under 1000 lb 19.80, 1000-19,900 lb 18.80, 20,000 lb and over 17.80; granular, add 1.0 premium to above.

Sodium Stannate: Less than 100 lb 67.2; 100-600 lb 53.2; 700-1900 lb 50.7; 2000-9900 lb 49; 10,000 lb or more 47.8.

Stannous Chloride (Anhydrous): Less than 50 lb $1.521; 50 lb $1.181; 100-300 lb $1.031; 400-900 lb $1.007; 1000-1900 lb 98.2; 2000-4900 lb 94.6; 5000-19,000 lb 88.5; 20,000 lb and over 82.4.

Stannous Sulphate: Less than 50 lb $1.223; 50 lb 92.3; 100-1900 lb 90.3; 2000 lb and over 88.3.

Zinc Cyanide: Under 1000 lb 54.30, 1000 lb and over 52.30.

Nonferrous Metals

Outlook for 1954: A buyers' market should prevail in nearly all nonferrous metals even though high levels of usage are expected to continue

A BUYERS' market will prevail in nearly all nonferrous metals in 1954. Emphasis is shifting to economical production and a fight for orders, with a return to negotiation of price and terms of preshortage days.

Businessmen think the fourth-quarter slowdown of 1953 will not continue far into this new year though no spectacular demand upsurge is foreseen. Industry's consumption of metals in 1953 shattered all previous records. High use levels will continue this year. Here's how the major metals fared in 1953 and the outlook for each in 1954:

Aluminum: Hard selling ahead. "With the major part of the expansion program begun three years ago completed, the aluminum industry has shifted its emphasis from increasing production to market development and increasing sales." With these words Reynolds Metals Co.'s R. S. Reynolds Jr. sums up the 1954 aluminum outlook. Says Alcoa's I. W. Wilson: "There will be greater emphasis on salesmanship."

Primary output this year will approach 1.4 million tons, a 12 per cent increase from 1953's 1.25 million tons. Completion of presently planned facilities will result in total productive capacity of 1.55 million tons. Shipments of aluminum products last year were over 1.75 million tons, easily the best mark ever.

This year will see more maneuvering by sales departments. Already price concessions are showing up.

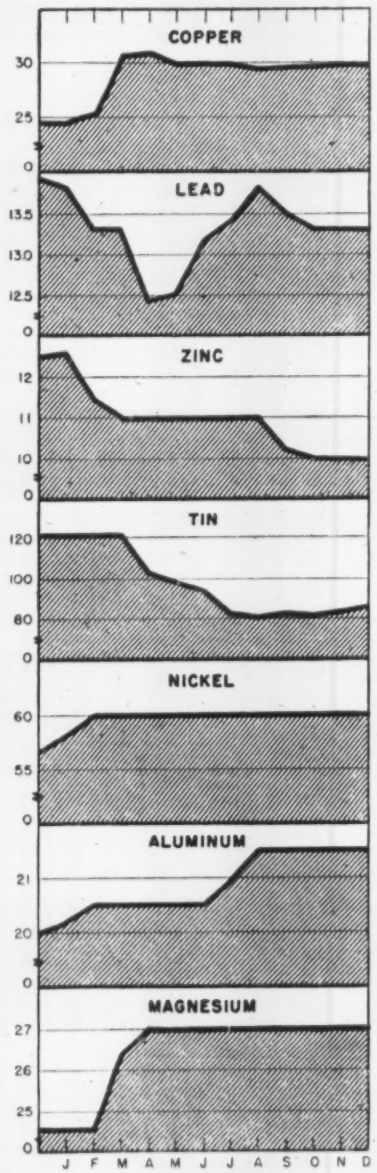
Copper: Riding for a fall. After advancing in 1953 to its highest peak in a half century, world copper price is now on the wane. That U. S. buyers will pay less for copper in 1954 is almost universally conceded. First quarter will likely see the price start downhill.

Domestic smelter output in 1953 from U. S. ores totaled about 950,000 tons of copper, some 110,000 tons of which was secondary metal. Total U. S. refined production, which includes copper from foreign concentrates, was about 1.38 million tons. Shipments of copper and copper-base alloy mill and foundry products amounted to over 2.55 million tons.

Lead: Steady price and supply. Off only one cent in price in 1953, lead is in for a steady year with no wide price fluctuations. U. S. refined output last year was about 585,000 tons. Imports of ore, bullion and refined lead accounted for nearly 595,000 tons. Peak of the imports is past and a slight price advance in early 1954 is possible. Consumption is running at an all-time high of about 1.2 million tons and will continue at slightly below that level.

How Prices Went in 1953

(Cents per pound)



Magnesium: Toehold in industry. Seeking civilian applications to augment military uses, magnesium men say their metal will be plentiful next year. Price will be stable or drift lower. It increased 2.5 cents in 1953. Primary production will be off from the estimated 92,940 tons of 1953 as four government plants have been closed and further cutbacks are possible. Total use last year approximated 45,000 tons, up 3000 tons from 1952. New high-speed mills will be in full operation this year and may allow price reductions.

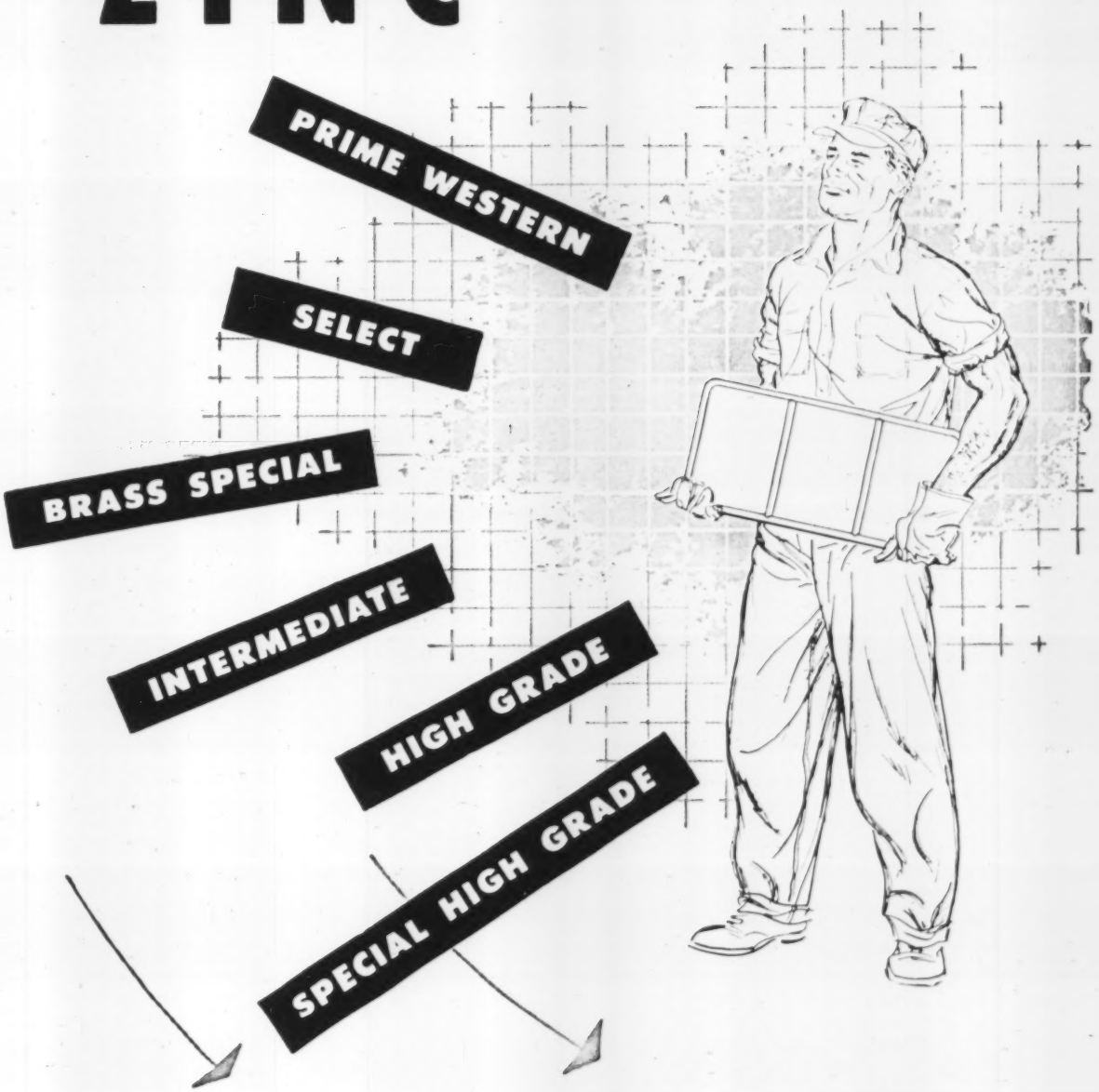
Nickel: Enigma of the stockpile. Choke point for electroplaters and producers of ferrous and nonferrous nickel alloys in 1953, the nickel supply this year will not improve appreciably unless the government stockpile philosophy is altered (STEEL, Dec. 28, p.27). Free world production in 1954 should reach about 192,599 tons, an increase of 22,500 tons from 1953 and a rise of more than 25 per cent since 1949. Nickel price went up 3.5 cents last year; further increase this year is possible.

Tin: More than you'll need. At this time last year tin sold for $1.215, today it's hovering a bit over 80 cents, though industry last year used about a third more primary tin than in 1952. The U. S. stockpile is overflowing; not only will there be no new government buying next year, but it may sell some or all of its 40,000 tons "overage." The stockpile program has distorted the tin picture considerably.

Zinc: Use boom, price bust. Another all-time consumption peak was reached in zinc last year, when slightly over 1 million tons were used by industry. Smelter production also set a record mark, but precariously high stocks are forcing a number of mines and smelters to trim operations. The booming die-casting industry used nearly 300,000 tons of zinc last year and promises further growth in '54 with use curbs on nickel plating off. Galvanizing also increased and this use continues the largest outlet for zinc. Price skidded 2.5 cents last year as imported metal shook the market, but producers believe the bottom has been rounded and a recovery will be staged in '54.

SLAB ZINC

every grade of ZINC
for urgent military and
civilian requirements



AMERICAN ZINC SALES COMPANY

Distributors for

AMERICAN ZINC, LEAD & SMELTING COMPANY

Columbus, O. Chicago St. Louis New York

STEEL PRICES

Mill prices as reported to STEEL, cents per pound except as otherwise noted. Changes shown in italics.
Code numbers following mill points indicate producing company; key on page 497. Key to footnotes, page 499.

—SEMIFINISHED—

INGOTS, Carbon Forging (NT)

Fontana,Calif. K1	$86.00
Munhall,Pa. U5	59.00

INGOTS, Alloy (NT)

Detroit R7	$63.00
Fontana,Calif. K1	88.00
Midland,Pa. C18	62.00
Munhall,Pa. U5	62.00

BILLETS, BLOOMS & SLABS
Carbon Rerolling (NT)

Aliquippa,Pa. J5	$62.00
Bessemer,Pa. U5	62.00
Clairton,Pa. U5	62.00
Ensley,Ala. T2	62.00
Fairfield,Ala. T2	62.00
Fontana,Calif. K1	70.00
Gary,Ind. U5	62.00
Johnstown,Pa. B2	62.00
Lackawanna,N.Y. B2	62.00
Munhall,Pa. U5	62.00
So.Chicago,Ill. U5	62.00
So.Duquesne,Pa. U5	62.00

Carbon, Forging (NT)

Aliquippa,Pa. J5	$75.50
Bessemer,Pa. U5	75.50
Buffalo R2	75.50
Canton,O. R2	75.50
Clairton,Pa. U5	75.50
Cleveland R2	75.50
Conshohocken,Pa. A3	82.50
Detroit R7	78.50
Ensley,Ala. T2	75.50
Fairfield,Ala. T2	75.50
Fontana,Calif. K1	83.50
Gary,Ind. U5	75.50
Geneva,Utah C11	75.50
Houston S5	83.50
Johnstown,Pa. B2	75.50
Lackawanna,N.Y. B2	75.50
LosAngeles B3	94.50
Munhall,Pa. U5	75.50
Seattle B3	94.50
So.Chicago R2, U5, W14	75.50
So.Duquesne,Pa. U5	75.50
So.SanFrancisco B3	94.50

Alloy, Forging (NT)

Bethlehem,Pa. B2	$82.00
Buffalo R2	82.00
Canton,O. R2, T7	82.00
Conshohocken,Pa. A3	89.00
Detroit R7	84.00
Fontana,Calif. K1	101.00
Gary,Ind. U5	82.00
Houston S5	90.00
Ind.Harbor,Ind. Y1	82.00
Johnstown,Pa. B2	82.00
Lackawanna,N.Y. B2	82.00
LosAngeles B3	102.00
Massillon,O. R2	82.00
Midland,Pa. C18	82.00
Munhall,Pa. U5	82.00
So.Chicago R2, U5, W14	82.00
So.Duquesne,Pa. U5	82.00
Struthers,O. Y1	82.00
Warren,O. C17	82.00

ROUNDS, SEAMLESS TUBE (NT)

Buffalo R2	$92.50
Canton,O. R2	92.50
Cleveland R2	92.50
Fontana,Calif. K1	113.50
Gary,Ind. U5	92.50
Massillon,O. R2	92.50
So.Chicago,Ill. R2	92.50
So.Duquesne,Pa. U5	92.50

SHEET BAR (NT)

Fontana,Calif. K1	$93.18

SKELP

Aliquippa,Pa. J5	3.85
Munhall,Pa. U5	3.75
Warren,O. R2	3.75
Youngstown R2, U5	3.75

WIRE RODS

Alabama City,Ala. R2	4.525
Aliquippa,Pa. J5	4.525
Alton,Ill. L1	4.70
Buffalo W12	4.525
Cleveland A7	4.525
Donora,Pa. A7	4.525
Fairfield,Ala. T2	4.525
Fontana,Calif. K1	5.325
Houston S5	4.925
Johnstown,Pa. B2	4.525
Joliet,Ill. A7	4.525
Kansas City,Mo. S5	4.865
LosAngeles B3	5.325
Minnequa,Colo. C10	4.775
Monessen,Pa. P7	4.725
No.Tonawanda,N.Y. B11	4.525
Pittsburg,Calif. C11	5.175
Portsmouth,Ohio P12	4.525
Roebling,N.J. R5	4.625
So.Chicago,Ill. R2	4.525
Sparrows Point,Md. B2	4.625
Sterling,Ill. (1) N15	4.525
Struthers,O. Y1	4.525
Torrance,Calif. C11	5.325
Worcester,Mass. A7	4.825

—STRUCTURALS—

Carbon Steel Stand. Shapes

Alabama City,Ala. R2	4.10
Aliquippa,Pa. J5	4.10
Bessemer,Ala. T2	4.10
Bethlehem,Pa. B2	4.15
Clairton,Pa. U5	4.10
Fairfield,Ala. T2	4.10
Fontana,Calif. K1	4.75
Gary,Ind. U5	4.10
Geneva,Utah C11	4.10
Houston S5	4.50
Ind.Harbor,Ind. I-2	4.10
Johnstown,Pa. B2	4.15
Kansas City,Mo. S5	4.70
Lackawanna,N.Y. B2	4.15
LosAngeles B3	4.80
Minnequa,Colo. C10	4.55
Munhall,Pa. U5	4.10
Niles,Calif. P1	4.80
Phoenixville,Pa. P4	4.15
Seattle B3	4.85
So.Chicago,Ill. U5, W14	4.10
So.SanFrancisco B3	4.75
Torrance,Calif. C11	4.80
Weirton,W.Va. W6	4.35

Wide Flange

Bethlehem,Pa. B2	4.15
Clairton,Pa. U5	4.10
Fontana,Calif. K1	5.30
Lackawanna,N.Y. B2	4.15
Munhall,Pa. U5	4.10
Phoenixville,Pa. P4	4.95
So.Chicago,Ill. U5	4.10

Alloy Stand. Shapes

Clairton,Pa. U5	5.00
Fontana,Calif. K1	6.40
Gary,Ind. U5	5.00
Munhall,Pa. U5	5.00
So.Chicago,Ill. U5	5.00

H.S., L.A. Stand. Shapes

Aliquippa,Pa. J5	6.175
Bessemer,Ala. T2	6.175
Bethlehem,Pa. B2	6.20
Clairton,Pa. U5	6.175
Fairfield,Ala. T2	6.175
Fontana,Calif. K1	6.825
Gary,Ind. U5	6.175
Geneva,Utah C11	6.175
Ind.Harbor,Ind. I-2	6.175
Ind.Harbor,Ind. Y1	6.675
Johnstown,Pa. B2	6.20
Lackawanna,N.Y. B2	6.20
LosAngeles B3	6.85
Munhall,Pa. U5	6.175
Seattle B3	6.90
So.Chicago,Ill. U5, W14	6.175
So.SanFrancisco B3	6.80
Struthers,O. Y1	6.675

H.S., L.A. Wide Flange

Bethlehem,Pa. B2	6.20
Lackawanna,N.Y. B2	6.20
Munhall,Pa. U5	6.125
So.Chicago,Ill. U5	6.125

BEARING PILES

Munhall,Pa. U5	4.10
So.Chicago,Ill. U5	4.10

—PILING—

STEEL SHEET PILING

Ind.Harbor,Ind. I-2	4.925
Lackawanna,N.Y. B2	4.925
Munhall,Pa. U5	4.925
So.Chicago,Ill. U5	4.925

—PLATES—

PLATES, Carbon Steel

Alabama City,Ala. R2	4.10
Aliquippa,Pa. J5	4.10
Ashland,Ky. (15) A10	4.10
Bessemer,Ala. T2	4.10
Clairton,Pa. U5	4.10
Claymont,Del. C22	4.20
Cleveland J5, R2	4.10
Coatesville,Pa. L7	4.20
Conshohocken,Pa. A3	4.25
Ecorse,Mich. G5	4.30
Fairfield,Ala. T2	4.10
Fontana,Calif.(30) K1	4.75
Gary,Ind. U5	4.10
Geneva,Utah C11	4.10
Granite City,Ill. G4	4.30
Harrisburg,Pa. C5	4.10
Houston S5	4.50
Ind.Harbor,Ind. I-2, Y1	4.10
Johnstown,Pa. B2	4.10
Lackawanna,N.Y. B2	4.10
Minnequa,Colo. C10	4.95
Munhall,Pa. U5	4.10
Pittsburgh J5	4.10
Riverdale,Ill. A1	4.10
Seattle B3	5.00
Sharon,Pa. S3	4.10
So.Chicago,Ill. U5, W14	4.10
Sparrows Point,Md. B2	4.10
Steubenville,O. W10	4.10
Warren,O. R2	4.10
Weirton,W.Va. W6	4.10
Youngstown R2, U5, Y1	4.10

PLATES, Carbon Abras. Resist.

Fontana,Calif. K1	5.90
Geneva,Utah C11	5.25

PLATES, Wrought Iron

Economy,Pa. B14	9.30

PLATES, High-Strength Low-Alloy

Aliquippa,Pa. J5	6.25
Bessemer,Ala. T2	6.25
Clairton,Pa. U5	6.25
Cleveland J5	6.25
Conshohocken,Pa. A3	6.25
Ecorse,Mich. G5	6.45
Fairfield,Ala. T2	6.25
Fontana,Calif.(30) K1	6.95
Gary,Ind. U5	6.25
Geneva,Utah C11	6.25
Ind.Harbor,Ind. I-2	6.25
Ind.Harbor,Ind. Y1	6.75
Johnstown,Pa. B2	6.25
Lackawanna,N.Y. B2	6.25
Munhall,Pa. U5	6.25
Pittsburgh J5	6.25
Seattle B3	7.15
Sharon,Pa. S3	6.25
So.Chicago,Ill. U5, W14	6.25
Sparrows Point,Md. B2	6.25
Youngstown U5	6.25
Youngstown Y1	6.75

PLATES, Alloy

Claymont,Del. C22	5.55
Coatesville,Pa. L7	5.55
Fontana,Calif. K1	6.60
Gary,Ind. U5	5.55
Johnstown,Pa. B2	5.55
Munhall,Pa. U5	5.55
Sharon,Pa. S3	5.55
So.Chicago,Ill. U5, W14	5.55
Sparrows Point,Md. B2	5.55

FLOOR PLATES

Cleveland J5	5.15
Conshohocken,Pa. A3	5.15
Harrisburg,Pa. C5	5.15
Ind.Harbor,Ind. I-2	5.15
Munhall,Pa. U5	5.15
So.Chicago,Ill. U5	5.15

PLATES, Ingot Iron

Ashland c.l. (15) A10	4.35
Ashland l.c.l.(15) A10	4.85
Cleveland, c.l. R2	4.70
Warren,O. c.l. R2	4.70

—BARS—

BARS, Hot-Rolled Carbon

Aliquippa,Pa. J5	4.15
Alton,Ill. L1	4.35
Atlanta,Ga. A11	4.40
Bessemer,Ala. T2	4.15
Buffalo(31) R2	4.18
Clairton,Pa. U5	4.15
Cleveland(31) R2	4.21
Detroit R7	4.30
Ecorse,Mich. G5	4.35
Emeryville,Calif. J7	4.90
Fairfield,Ala. T2	4.15
Fairless,Pa. U5	4.30
Fontana,Calif. K1	4.85
Gary,Ind. U5	4.15
Gadsden,Ala.(31) R2	4.18
Houston S5	4.55
Ind.Harbor,Ind. I-2, Y1	4.15
Johnstown,Pa. B2	4.15
Kansas City,Mo. S5	4.75
Lackawanna,N.Y. B2	4.15
LosAngeles B3	4.85
Milton,Pa. M18	4.15
Minnequa,Colo. C10	4.60
Niles,Calif. P1	4.85
No.Tonawanda,N.Y. B11	4.15
Pittsburg,Calif. C11	4.85
Portsmouth,Ohio P12	4.15
Riverdale,Ill. A1	4.15
Seattle B3, N14	4.90
So.Chicago,Ill. U5, W14	4.15
Chicago(31) R2	4.22
So.Duquesne,Pa. U5	4.15
So.SanFran.,Calif. B3	4.90
Sterling,Ill.(1) N15	4.15
Struthers,O. Y1	4.15
Torrance,Calif. C11	4.85
Weirton,W.Va. W6	4.15
Youngstown U5	4.15
Youngstown(31) R2	4.20

BARS, Hot-Rolled Alloy

Bethlehem,Pa. B2	4.875
Buffalo R2	4.875
Canton,O. R2, T7	4.875
Clairton,Pa. U5	4.875
Detroit R7	4.975
Ecorse,Mich. G5	5.075
Fairless,Pa. U5	5.025
Fontana,Calif. K1	5.925
Gary,Ind. U5	4.875
Houston S5	5.275
Ind.Harbor,Ind. I-2, Y1	4.875
Johnstown,Pa. B2	4.875
KansasCity,Mo. S5	5.475
Lackawanna,N.Y. B2	4.875
LosAngeles B3	5.925
Massillon,O. R2	4.875
Midland,Pa. C18	4.875
So.Chicago R2, U5,W14	4.875
So.Duquesne,Pa. U5	4.875
Struthers,O. Y1	4.875
Warren,O. C17	4.875
Youngstown U5	4.875

BARS & SMALL SHAPES, H.R.
High-Strength Low-Alloy

Aliquippa,Pa. J5	6.225
Bessemer,Ala. T2	6.225
Bethlehem,Pa. B2	6.225
Clairton,Pa. U5	6.225
Ecorse,Mich. G5	6.425
Fairfield,Ala. T2	6.225
Fontana,Calif. K1	7.475
Gary,Ind. U5	6.225
Ind.Harb.,Ind. Y1	6.725
Ind.Harb.,Ind. I-2	6.225
Johnstown,Pa. B2	6.225
Lackawanna,N.Y. B2	6.225
LosAngeles B3	6.925
Pittsburgh J5	6.225
Seattle B3	6.975
So.Chicago W14	6.225
So.Duquesne,Pa. U5	6.225
So.SanFrancisco B3	6.975
Struthers,O. Y1	6.725
Youngstown U5	6.225

BAR SIZE ANGLES; H.R.CARBON

Bethlehem,Pa. B2	4.35

BAR SIZE ANGLES; S. Shapes

Aliquippa,Pa. J5	4.15
Atlanta A11	4.40
Niles,Calif. P1	4.85
SanFrancisco S7	5.10

BAR SHAPES, Hot-Rolled Alloy

Clairton,Pa. U5	5.60
Fontana,Calif. K1	6.60
Gary,Ind. U5	5.60
Houston S5	5.60
KansasCity S5	5.60
Youngstown U5	5.60

BARS, Cold-Finished Carbon

Ambridge,Pa. W18	5.20
BeaverFalls,Pa. M12, R2	5.20
Buffalo B5	5.25
Camden,N.J. P13	5.65
Carnegie,Pa. C12	5.20
Chicago W18	5.20
Cleveland A7, C20	5.20
Detroit P17, R7	5.35
Detroit B5	5.40
Donora,Pa. A7	5.20
Elyria,O. W8	5.20
Franklin Park,Ill. N5	5.20
Gary,Ind. R2	5.20
GreenBay,Wis. F7	5.20
Hammond,Ind. I-2, M13	5.20
Hartford,Conn. R2	5.75
Harvey,Ill. B5	5.20
LosAngeles R2	6.65
Mansfield,Mass. B5	5.75
Massillon,O. R2, R8	5.20
Monaca,Pa. S17	5.20
Newark,N.J. W18	5.65
NewCastle,Pa. (17) B4	5.20
Pittsburgh J5	5.20
Plymouth,Mich. P5	5.45
Putnam,Conn. W18	5.75
Readville,Mass. C14	5.75
St.Louis,Mo. M5	5.50
So.Chicago,Ill. W14	5.20
SpringCity,Pa. K3	5.65
Struthers,O. Y1	5.20
Waukegan,Ill. A7	5.20
Worcester,Mass. W19	6.10
Youngstown F3, Y1	5.20

BARS, Cold-Finished Carbon
(Turned and Ground)

Cumberland,Md. (5) C19	4.45

BARS, Cold-Finishing Alloy

Amoridge,Pa. W18	6.325
BeaverFalls,Pa. M12	6.325
Bethlehem,Pa. B2	6.325
Buffalo B5	6.325
Camden,N.J. P13	6.50
Canton,O. R2, T7	6.325
Carnegie,Pa. C12	6.325
Chicago W18	6.325
Cleveland A7, C20	6.325
Detroit R7	6.425
Detroit P17	6.475
Detroit B5	6.525
Donora,Pa. A7	6.325
Elyria,O. W8	6.325
Gary,Ind. R2	6.325
Hammond,Ind. L2, M13	6.325
Hartford,Conn. R2	6.775
Harvey,Ill. B5	6.325
Lackawanna,N.Y. B2	6.325
Mansfield,Mass. B5	6.775
Massillon,O. R2, R8	6.325
Midland,Pa. C18	6.325
Monaca,Pa. S17	6.325
Newark,N.J. W18	6.65
Plymouth,Mich. P5	6.525
So.Chicago,Ill. R2, W14	6.325
SpringCity,Pa. K3	6.50
Struthers,O. Y1	6.325
Warren,O. C17	6.325
Waukegan,Ill. A7	6.325
Worcester,Mass. A7	6.625
Youngstown F3, Y1	6.325

BARS, Reinforcing (Fabricators)

Alabama City,Ala. R2	4.15
Atlanta A11	4.40
Buffalo R2	4.15
Cleveland R2	4.15
Emeryville,Calif. J7	4.90
Fairfield,Ala. T2	4.15
Fairless,Pa. U5	4.30
Fontana,Calif. K1	4.85
Gary,Ind. U5	4.15
Houston S5	4.55
Ind.Harbor,Ind. I-2, Y1	4.15
Johnstown,Pa. B2	4.15
KansasCity,Mo. S5	4.75
Lackawanna,N.Y. B2	4.15
LosAngeles B3	4.85
Milton,Pa. M18	4.15
Minnequa,Colo. C10	4.75
Niles,Calif. P1	4.85
Pittsburg,Calif. C11	4.85
Pittsburgh J5	4.15
SandSprings,Okla. S5	5.00
Seattle B3, N14	4.90
So.Chicago,Ill. R2	4.15
So.Duquesne,Pa. U5	4.15
So.SanFrancisco B3	4.90
SparrowsPoint,Md. B2	4.15
Sterling,Ill. (1) N15	4.15
Struthers,O. Y1	4.15
Torrance,Calif. C11	4.85
Youngstown R2, U5	4.15

BARS, Reinforcing
(Fabricated; to consumers)

Johnstown, ¼-1" B2	5.55
KansasCity S5	6.35
LosAngeles B3	5.80
Marion,O. P11	5.55
Seattle N14	5.80
Seattle B3	5.85
So.SanFrancisco B3	5.85
SparrowsPt. ½-1" B2	5.55
Williamsport,Pa. S19	5.45

RAIL STEEL BARS

Axis Pa. (4) J8	4.25
ChicagoHts.(3,4) C2	4.15
ChicagoHts.(3,4) I-2	*4.15*
Fairfield,Ala.(3,4) T2	4.65
Franklin,Pa.(3,4) F5	4.15
Marion,O.(3) P11	4.25
Moline,Ill.(3) R2	4.25
Tonawanda(3,4) B12	5.00
Williamsport,Pa.(3) S19	4.50
Williamsport,Pa.(4) S19	5.45

BARS, Wrought Iron

Economy,Pa.(S.R.) B14	10.40
Economy,Pa.(D.R.) B14	12.90
Economy(Staybolt) B14	13.20
Mc.K.Rks.(S.R.) L5	10.40
Mc.K.Rks.(D.R.) L5	14.00
McK.Rks.(Staybolt) L5	15.50

—SHEETS—

SHEETS, Hot-Rolled Steel
(18 gage and heavier)

Alabama City,Ala. R2	3.925
Allenport,Pa. P7	3.925
Ashland,Ky.(8) A10	3.925
Butler,Pa. A10	3.925
Cleveland J5, R2	3.925
Conshohocken,Pa. A3	4.05
Detroit M1	4.15
Ecorse,Mich. G5	4.125
Fairfield,Ala. T2	3.925
Fairless,Pa. U5	4.025
Fontana,Calif. K1	4.70
Gary,Ind. U5	3.925
Geneva,Utah C11	4.025
Granite City,Ill. G4	4.125
Ind.Harbor,Ind. I-2, Y1	3.925
Irvin,Pa. U5	3.925
Kokomo,Ind. C16	4.025
Lackawanna,N.Y. B2	3.925

Munhall,Pa. U5 .....3.925
Newport,Ky N9 .....3.925
Niles,O. N12 .....5.175
Pittsburg,Calif. C11 ...4.625
Pittsburgh J5 .....3.925
Portsmouth,O. P12 ....3.925
Riverdale,Ill. A1 .....3.925
Sharon,Pa. S3 .....3.925
So.Chicago,Ill. W14 ..3.925
SparrowsPoint,Md. B2..3.925
Steubenville,O. W10 ..3.925
Torrance,Calif. C11 ...4.625
Warren,O. R2 .....3.925
Weirton,W.Va. W6 ....3.925
Youngstown U5, Y1 ..3.925

SHEETS, H.R. (19 gage)

AlabamaCity, Ala. R2..5.225
Dover,O. R1 .....5.05
Kokomo,Ind. C16 .....5.025
Mansfield,O. E6 .....5.05
Niles,O. N12 .....4.775
Torrance,Calif. C11 ...5.875

SHEETS, H.R. (14 ga. heavier) High-Strength Low-Alloy

Cleveland J5, R2 .....5.90
Conshohocken,Pa. A3 ..5.90
Ecorse,Mich. G5 .....6.10
Fairfield,Ala. T2 .....5.90
Fontana,Calif. K1 ....6.675
Gary,Ind. U5 .....5.90
Ind.Harbor,Ind. I-2 ....5.90
Ind.Harbor,Ind. Y1 ....6.40
Irvin,Pa. U5 .....5.90
Lackawanna(35) B2 ....5.90
Munhall,Pa. U5 .....5.90
Pittsburgh J5 .....5.90
Sharon,Pa. S3 .....5.90
So. Chicago,Ill. U5 .....5.90
SparrowsPoint(38) B2 ..5.90
Warren,O. R2 .....5.90
Weirton,W.Va. W6 .....5.90
Youngstown U5 .....5.90
Youngstown Y1 .....6.40

SHEETS, Hot-Rolled Ingot Iron (18 Gage and Heavier)

Ashland,Ky.(8) A10 ..4.175
Cleveland R2 .....4.525
Ind.Harbor,Ind. I-2 ...4.175
Warren,O. R2 .....4.525

SHEETS, Cold-Rolled Steel (Commercial Quality)

Allenport,Pa. P7 .....4.775
Cleveland J5, R2 .....4.775
Ecorse,Mich. G5 .....4.975
Fairfield,Ala. T2 .....4.775
Fairless,Pa. U5 .....4.875
Follansbee,W.Va. F4 ..4.775
Fontana,Calif. K1 ....5.875
Gary,Ind. U5 .....4.775
GraniteCity,Ill. G4 ....4.975
Ind.Harbor,Ind. I-2,Y1 4.775
Irvin,Pa. U5 .....4.775
Lackawanna,N.Y. B2 ...4.775
Middletown,O. A10 ....4.775
Pittsburg,Calif. C11 ...5.725
Pittsburgh J5 .....4.775
Portsmouth,O. P12 ....4.775
SparrowsPoint,Md. B2 4.775
Steubenville,O. W10 ...4.775
Warren,O. R2 .....4.775
Weirton,W.Va. W6 ....4.775
Youngstown Y1 .....4.775

SHEETS, Cold-Rolled High-Strength Low Alloy

Cleveland J5, R2 .....7.225
Ecorse,Mich. G5 .....7.425
Fontana,Calif. K1 ....8.275
Gary,Ind. U5 .....7.225
IndianaHarbor,Ind. Y1 7.725
Irvin,Pa. U5 .....7.225
Lackawanna(37) B2 ....7.225
Pittsburgh J5 .....7.225
SparrowsPoint (38) B2 7.225
Warren,O. R2 .....7.225
Weirton,W.Va. W6 .....7.225
Youngstown Y1 .....7.725

SHEETS, Cold-Rolled Ingot Iron

Cleveland R2 .....5.375
Middletown,O. A10 ....5.275
Warren,O. R2 .....5.375

SHEETS, Gal'd No. 10 Steel

AlabamaCity,Ala. R2..5.275
Ashland,Ky. (8) A10 ..5.275
Canton,O. R2 .....5.275
Delphos,O. N16 .....5.775
Dover,O. R1 .....5.275
Fairfield,Ala. T2 ....5.275†
Gary,Ind. U5 .....5.275†
GraniteCity,Ill. G4 ....5.475
Ind.Harbor,Ind. I-2 ....5.325
Irvin,Pa. U5 .....5.275†
Kokomo,Ind.(13) C16..5.375
MartinsFerry,O. W10..5.275
Niles,O. N12 .....5.275
Pittsburg,Calif. C11 ...6.025†
SparrowsPoint, Md. B2..5.275
Steubenville,O. W10 ...5.275
Torrance,Calif. C11 ...6.275†
Weirton,W.Va. W6 ....5.275

†Based on 5c zinc.

SHEETS, Galvanized No. 10 High-Strength Low-Alloy

Irvin,Pa. U5 .....7.925
SparrowsPoint(39) B2 .8.075

SHEETS, Galvanized Ingot Iron No. 10 flat

Ashland,Ky.(8) A10 ..5.525
Canton,O. R2 .....6.025

SHEETS, Culvert	Cu Alloy	Cu Fe
Ashland,Ky. A10	6.325	....
Canton,O. R2	6.475	6.925
Fairfield T2	6.075	6.325
Gary,Ind. U5	6.075	6.325
Ind.Harbor I-2	6.075	6.325
Irvin,Pa. U5	6.075	6.325
Kokomo,Ind. C16	6.175	....
MartinsFerry,O.W10	6.075	....
Pitts.,Cal. C11	6.825	....
SparrowsPt. B2	6.075	....
Torrance,Cal. C11	7.075	....

SHEETS, Culvert	Pure Iron
Ashland,Ky. A10	6.375
Fairfield, Ala. T2	6.325
MartinsFerry,O. W10	6.325

SHEETS, Galvannealed Steel

Canton,O. R2 .....5.825
Irvin,Pa. U5 .....5.825†
Kokomo,Ind.(13) C16..5.925
Niles,O. N12 .....5.825

†Based on 5c zinc

SHEETS, ZINCGRIP Steel

Butler,Pa. A10 .....5.525
Middletown,O. A10 ....5.525

SHEETS, ZINCGRIP Ingot Iron

Butler,Pa. A10 .....5.775
Middletown,O. A10 ....5.775

SHEETS, Electrogalvanized

Cleveland R2 (28) 6.125
Niles,O. R2 (28) 6.125
Weirton,W.Va. W6 ....5.975

SHEETS, ALUMINIZED

Butler,Pa. A10 .....8.625

SHEETS, Enameling Iron

Ashland,Ky.(8) A10 ..5.175
Cleveland R2 .....5.175
Gary,Ind. U5 .....5.175
GraniteCity,Ill. G4 ...5.875
Ind. Harbor,Ind. I-2 ...5.175
Irvin,Pa. U5 .....5.175
Middletown,O. A10 ....5.175
Niles,O. N12 .....6.525
Youngstown Y1 .....5.175

BLUED STOCK, 29 ga.

Follansbee,W.Va. F4 ..7.30
Follansbee (23) F4 ...7.175
Yorkville,O. W10 .....7.20

SHEETS, Long Terne Steel (Commercial Quality)

BeechBott'm,W.Va.W10 5.675
Gary,Ind. U5 .....5.675
Mansfield,O. E6 .....5.675
Middletown,O. A10 ....5.675
Niles,O. N12 .....5.675
Weirton,W.Va. W6 ...5.675

SHEETS, Long Terne, Ingot Iron

Middletown,O. A10 ....6.075

SHEETS, Well Casing

Fontana,Calif. K1 ....6.20

—STRIP—

STRIP, Hot-Rolled Carbon

Ala.City,Ala.(27) R2 .3.925
Allenport,Pa. P7 .....3.925
Alton,Ill. L1 .....4.10
Ashland,Ky.(8) A10 ..3.925
Atlanta A11 .....4.175
Bessemer,Ala. T2 .....3.925
Bridgeport,Conn.(10)S15 4.15
Buffalo (27) R2 .....3.925
Carnegie,Pa. S18 .....4.425
Conshohocken,Pa. A3 ..4.05
Detroit M1 .....4.15
Ecorse,Mich. G5 .....4.125
Fairfield,Ala. T2 .....3.925
Fontana,Calif. K1 .....4.70
Gary,Ind. U5 .....3.925
Houston Tex. S5 .....4.325
Ind.Harbor,Ind. I-2,Y1 3.925
Johnstown,Pa.(25) B2 3.925
KansasCity,Mo.(9) S5..4.525
Lackw'na,N.Y.(25) B2 3.925
LosAngeles(25) B3 ....4.675
Milton,Pa. M18 .....3.925
Minnequa,Colo. C10 ...5.025
NewBritain(10) S15 .....4.15
N.Tonawanda,N.Y.B11 3.925
Pittsburg,Calif. C11 ...4.675
Portsmouth,O. P12 ....3.925
Riverdale,Ill. A1 .....3.925
SanFrancisco S7 .....5.10
Seattle(25) B3 .....4.925
Seattle N14 .....4.925
Sharon,Pa. S3 .....3.925
So.Chicago,Ill. W14 ...3.925
So.SanFrancisco(25)B3 4.675
SparrowsPoint,Md. B2.3.925
Torrance,Calif. C11 ...4.675
Warren,O. R2 .....3.925
Weirton,W.Va. W6 ....3.925
Youngstown U5 .....3.925

STRIP, Hot-Rolled Alloy

Bridgeport,Conn.(10)S15 6.45
Carnegie,Pa. S18 .....6.40
Fontana,Calif. K1 .....7.80
Gary,Ind. U5 .....6.40
Houston,Tex. S5 .....6.80
KansasCity, Mo. S5 ....7.00
LosAngeles B3 .....7.60
NewBritn.,Conn.(10)S15 6.45
Sharon,Pa. S3 .....6.40
So.Chicago W14 .....6.40
Youngstown U5 .....6.40

STRIP, Hot-Rolled High-Strength Low-Alloy

Bessemer,Ala. T2 .....5.95
Conshohocken,Pa. A3 ..5.90
Ecorse,Mich. G5 .....6.15
Fairfield,Ala. T2 .....5.95
Fontana,Calif. K1 .....7.05
Gary,Ind. U5 .....5.95
Ind.Harbor,Ind. I-2 ....5.95
Ind.Harbor,Ind. Y1 ....6.45
Lackawanna,N.Y. B2 ...6.00
LosAngeles(25) B3 ....6.70
Seattle(25) B3 .....6.95
Sharon,Pa. S3 .....5.95
So.SanFrancisco(25) B3 6.70
SparrowsPoint,Md. B2 ..6.00
Warren,O. R2 .....5.95
Weirton,W.Va. W6 ....5.95
Youngstown Y1 .....6.45
Youngstown U5 .....5.95

STRIP, Hot-Rolled Ingot Iron

Ashland,Ky.(8) A10 ..4.175
Warren,O. R2 .....4.525

STRIP, Cold-Rolled Carbon

Anderson,Ind. G6 .....5.45
Bridgeprt,Conn. (10)S15 5.75
Cleveland A7, J5 .....5.45
Dearborn,Mich. D3 ....5.65
Detroit P20 .....5.70
Detroit D2, M1 .....5.65
Dover,O. G6 .....5.45
Ecorse,Mich. G5 .....5.65
Follansbee,W.Va. F4 ....5.45
Fontana,Calif. K1 .....7.35
FranklinPark,Ill. T6 ....5.70
Ind.Harbor,Ind. I-2 ....5.70
Lackawanna,N.Y. B2 ....5.45
LosAngeles C1 .....7.50
Mattapan,Mass. T6 ....6.30
Middletown,O. A10 ....5.45
NewBedford,Mass. B10 6.00
NewBritain(10) S15 ....5.75
NewCastle,Pa. B4, E5..5.45
NewHaven,Conn. A7 ....6.20
NewHaven,Conn. D2 ....5.90
Pawtucket,R.I. N8, B3 6.30
Pittsburgh J5 .....5.45
Riverdale,Ill. A1 .....5.70
Rome,N.Y.(29) R6 .....5.45
Sharon,Pa. S3 .....5.45
SparrowsPoint,Md. B2 ..5.45
Trenton,N.J. R5 .....7.00
Wallford,Conn. W2 ....6.20
Warren,O.(40) T5 .....5.45
Warren,O. B9, R2 .....5.45
Weirton,W.Va. W6 .....5.45
Worcester,Mass. W19 ....7.05
Worcester,Mass. A7 ....6.30
Youngstown C8 .....5.95
Youngstown Y1 .....5.45

STRIP, Cold-Rolled Alloy Steel

Carnegie,Pa. S18 .....12.00
Cleveland A7 .....12.00
Dover,O. G6 .....12.00
Fontana,Calif. K1 ....13.65
Harrison,N.J. C18 ....12.00
Pawtucket,R.I.(11) NS 12.15
Pawtucket,R.I.(12) NS 12.45
Sharon,Pa. S3 .....12.00
Worcester,Mass. A7 ..12.30
Youngstown C8 .....12.00

STRIP, Cold-Rolled High-Strength Low-Alloy

Cleveland J5 .....7.80
Cleveland A7 .....8.15
Dearborn,Mich. D3 ....7.90
Dover,O. G6 .....8.00
Ecorse,Mich. G5 .....8.35
Lackawanna,N.Y. B2 ...8.15
Pittsburgh J5 .....7.80
Sharon,Pa. S3 .....7.65
SparrowsPoint, Md. B2..8.15
Warren,O. R2 .....7.60
Weirton,W.Va. W6 .....8.15
Youngstown Y1 .....8.30

STRIP, Cold-Rolled Ingot Iron

Warren,O. R2 .....6.05

STRIP, Electrogalvanized

Dover,O. G6 .....5.45
Warren,O. B9, T5 .....5.45
Weirton,W.Va. W6 .....5.45
Youngstown C8 .....5.70

TIGHT COOPERAGE HOOP

Atlanta A11 .....4.65
Riverdale,Ill. A1 .....4.50
Sharon,Pa. S3 .....4.35
Youngstown U5 .....4.35

Key to Producers

A1 Acme Steel Co.
A3 Alan Wood Steel Co.
A4 Allegheny Ludlum Steel
A5 Alloy Metal Wire Co.
A7 American Steel & Wire
A9 Angell Nail & Chaplet
A10 Armco Steel Corp.
A11 Atlantic Steel Co.
A13 American CladmetalsCo.

B1 Babcock & Wilcox Co.
B2 Bethlehem Steel Co.
B3 Beth. Pac. Coast Steel
B4 Blair Strip Steel Co.
B5 Bliss & Laughlin Inc.
B8 Braeburn Alloy Steel
B9 Brainard Steel Div., Sharon Steel Corp.
B10 E. & G. Brooke, Wickwire Spencer Div., Colo. Fuel & Iron
B11 Buffalo Bolt Co. Div., Buffalo-Eclipse Corp.
B12 Buffalo Steel Div. H. K. Porter Co.
B14 A. M. Byers Co.
B15 J. Bishop & Co.

C1 Calstrip Steel Corp.
C2 Calumet Steel Div., Borg-Warner Corp.
C4 Carpenter Steel Co.
C5 Central Iron & Steel Div. Barium Steel Corp.
C7 Cleve. Cold Rolling Mills
C8 Cold Metal Products Co.
C9 Colonial Steel Co.
C10 Colorado Fuel & Iron
C11 Columbia-Geneva Steel
C12 Columbia Steel & Shaft.
C13 Columbia Tool Steel Co.
C14 Compressed Steel Shaft.
C16 Continental Steel Corp.
C17 Copperweld Steel Co.
C18 Crucible Steel Co.
C19 Cumberland Steel Co.
C20 Cuyahoga Steel & Wire
C22 Claymont Steel Products Dept. Wickwire Spencer Steel Division
C23 Charter Wire Products
C24 G. O. Carlson Inc.

D2 Detroit Steel Corp.
D3 Detroit Tube & Steel
D4 Disston & Sons, Henry
D6 Driver Harris Co.
D7 Dickson Weatherproof Nail Co.
D8 Damascus Tube Co.
D9 Wilbur B. Driver Co.

E1 Eastern Gas&Fuel Assoc.
E2 Eastern Stainless Steel
E4 Electro Metallurgical Co.
E5 Elliott Bros. Steel Co.
E6 Empire Steel Corp.

F2 Firth Sterling Inc.
F3 Fitzsimmons Steel Co.
F4 Follansbee Steel Corp.
F5 Franklin Steel Div., Borg-Warner Corp.
F6 Fretz-Moon Tube Co.
F7 Ft. Howard Steel & Wire
F8 Ft. Wayne Metals Inc.

G2 Globe Iron Co.
G4 Granite City Steel Co.
G5 Great Lakes Steel Corp.
G6 Greer Steel Co.

H1 Hanna Furnace Corp.
H7 Helical Tube Co.

I-1 Igoe Bros. Inc.
I-2 Inland Steel Co.
I-3 Interlake Iron Corp.
I-4 Ingersoll Steel Div., Borg-Warner Corp.
I-7 Indiana Steel&Wire Co.

J1 Jackson Iron&Steel Co.
J3 Jessop Steel Co.
J4 Johnson Steel&Wire Co.
J5 Jones & Laughlin Steel
J6 Joslyn Mfg. & Supply
J7 Judson Steel Corp.
J8 Jersey Shore Steel Co.

K1 Kaiser Steel Corp.
K2 Keokuk Electro-Metals
K3 Keystone Drawn Steel
K4 Keystone Steel & Wire
K7 Kenmore Metals Corp.

L1 Laclede Steel Co.
L2 LaSalle Steel Co.
L3 Latrobe Steel Co.
L5 Lockhart Iron & Steel
L6 Lone Star Steel Co.
L7 Lukens Steel Co.

M1 McLouth Steel Corp.
M4 Mahoning Valley Steel
M5 Medart Co.
M6 Mercer Tube & Mfg. Co.
M8 Mid-States Steel & Wire
M12 Moltrup Steel Products
M13 Monarch Steel Co.
M16 Md. Fine & Special Wire
M17 Metal Forming Corp.
M18 Milton Steel Prod. Div., Merritt-Chapman&Scott

N2 National Supply Co.
N3 National Tube Div.
N5 Nelsen Steel & Wire Co.
N6 NewEng.HighCarb.Wire
N8 Newman-Crosby Steel
N9 Newport Steel Corp.
N12 Niles Rolling Mill Div.
N14 Nrthwst.Steel Roll. Mills
N15 Northwestern S.&W. Co.
N16 New Delphos Mfg. Co.

O3 Oliver Iron & Steel Corp.
O4 Oregon Steel Mills

P1 Pacific States Steel Corp.
P4 Phoenix Iron & Steel Co.
P5 Pilgrim Drawn Steel
P6 Pittsburgh Coke&Chem.
P7 Pittsburgh Steel Co.
P11 Pollak Steel Co.
P12 Portsmouth Division Detroit Steel Corp.
P13 Precision Drawn Steel
P14 Pitts. Screw & Bolt Co.
P15 Pittsburgh Metallurgical
P16 Page Steel & Wire Div., Amer. Chain & Cable
P17 Plymouth Steel Co.
P20 Prod.Steel Strip Corp.

R1 Reeves Steel & Mfg. Co.
R2 Republic Steel Corp.
R3 Rhode Island Steel Corp.
R5 Roebling's Sons,JohnA.
R6 Rome Strip Steel Co.
R7 Rotary Electric Steel Co.
R8 ReliancеDiv.,EatonMfg.
R9 Rome Mfg. Co.
R10 Rodney Metals Inc.

S1 Seneca Wire & Mfg. Co.
S3 Sharon Steel Corp.
S4 Sharon Tube Co.
S5 Sheffield Steel Corp.
S6 Shenango Furnace Co.
S7 Simmons Co.
S8 Simonds Saw & Steel Co.
S13 Standard Forgings Corp.
S14 Standard Tube Co.
S15 Stanley Works
S16 Struthers Iron & Steel
S17 Superior Drawn SteelCo.
S18 Superior Steel Corp.
S19 Swe't's Steel Co.
S20 Southern States Steel
S25 StainlessWeldedProducts
S26 Specialty Wire Co. Inc.

T2 Tenn. Coal & Iron Div.
T3 Tenn. Prod. & Chem.
T4 Texas Steel Co.
T5 Thomas Strip Division, Pittsburgh Steel Co.
T6 Thompson Wire Co.
T7 Timken Roller Bearing
T8 Tonawanda Iron Div., Am. Rad & Stan. San.
T13 Tube Methods Inc.

U4 Universal-Cyclops Steel
U5 United States Steel Corp.
U6 U. S. Pipe & Foundry

V2 Vanadium-Alloys Steel
V3 Vulcan Crucible SteelCo.

W1 Wallace Barnes Co.
W2 Wallingford Steel Co.
W3 Washburn Wire Co.
W4 Washington Steel Corp.
W6 Weirton Steel Co.
W7 W. Va. Steel&Mfg. Co.
W8 West Auto Mach.Screw
W9 Wheatland Tube Co.
W10 Wheeling Steel Corp.
W12 Wickwire Spencer Steel Div., Colo. Fuel & Iron
W13 Wilson Steel & Wire Co.
W14 Wisconsin Steel Div. International Harvester
W15 Woodward Iron Co.
W18 Wyckoff Steel Co.
W19 Worcester Pressed Steel
Y1 Youngstown Sheet & Tube

STRIP, Cold-Finished Spring Steel (Annealed)	0.26-0.40C	0.41-0.60C	0.61-0.80C	0.81-1.05C	1.06-1.35C
Berea,O. C7	...	8.00	8.60	10.55	12.85
Bridgeport,Conn.(10) S15	5.75	7.65	8.60	10.55	12.85
Bristol,Conn. W1	...	...	8.90	10.85	....
Carnegie,Pa. S18	...	7.65	8.60	10.55	12.85
Cleveland A7	5.45	7.65	8.60	10.55	12.85
Dearborn,Mich. D3	5.65	7.85	8.80	....	....
Detroit D2	5.65	7.85	8.45	10.55	....
Dover,O. G6	5.45	7.65	8.60	10.55	12.85
FranklinPark,Ill. T6	5.80	7.80	8.75	10.70	....
Harrison,N.J. C18	...	...	8.90	10.85	13.15
Mattapan,Mass. T6	6.30	7.95	8.90	10.85	13.15
NewBritn.,Conn.(10) S15	5.75	7.65	8.60	10.55	12.85
NewCastle,Pa. B4	5.45	7.65	8.60	....	....
NewCastle,Pa. E5	5.45	8.00	8.60	10.55	12.85
NewHaven,Conn. D2	5.90	7.95	8.55	10.65	....
NewYork W3	...	7.95	8.90	10.85	13.15
Pawtucket,R.I. N8: Cleve.orPitts.Base	...	7.65	8.60	10.55	12.85
Worcester,Mass.,Base	6.65	7.95	8.90	10.85	13.15
Sharon,Pa. S3	5.45	7.65	8.60	10.55	12.85
Trenton,N.J. R5	...	7.95	8.90	10.85	13.15
Wallingford,Conn. W2	6.20	7.95	8.90	10.85	13.15
Warren,O. T5	5.45	7.65	8.60	10.55	12.85
Weirton,W.Va. W6	5.45	7.65	8.60	10.55	12.85
Worcester,Mass. A7	6.30	7.95	8.90	10.85	13.15
Worcester,Mass. T6	6.30	7.95	8.90	10.85	13.15
Youngstown C8	...	7.65	8.60	10.55	12.85
Spring Steel (Tempered)					
Buffalo W12	...	...	12.50	....	....
Bristol,Conn. W1	...	...	12.50	15.00	....
FranklinPark,Ill. T6	...	...	12.50	15.00	18.00
Harrison,N.J. C18	...	...	12.50	15.00	18.00
NewYork W3	...	...	12.50	15.00	18.00
Trenton,N.J. R5	...	...	12.50	15.00	18.00
Worcester,Mass. T6	...	...	12.50	15.00	18.00
Worcester,Mass. W12	...	...	12.50	....	....
Youngstown C8	...	...	12.50	15.00	18.00

SILICON STEEL

SHEETS, SILICON, H.R. or C.R.(22Ga.) COILS (Cut Lengths ½c lower)	Field	Arma-ture	Elec-tric	Dyna-Motor	mo
BeechBottom W10 (cut lengths)	...	...	8.35	9.60	10.40
Brackenridge,Pa. A4	...	...	8.85	10.10	10.90
GraniteCity,Ill. G4 (cut lengths)	...	...	8.55	9.80	....
IndianaHarbor,Ind. I-2	8.05	8.35	8.85	(34)	....
Mansfield,O. E6 (cut-lengths)	7.55	7.85	8.35	9.60	10.40
Newport,Ky. N9 (cut lengths)	....	7.85	8.35	9.60	10.40
Niles,O. N12 (cut lengths)	7.55	7.85	8.35	....	....
Vandergrift,Pa. U5 (cut lengths)		*8.15*	*8.75*	*9.75*	*10.65*
Warren,O. R2	8.05	8.35	8.85	10.10	10.90
Zanesville,O. A10	...	8.35	8.85	10.10	10.90

SHEET, SILICON (22 Ga. Base) COILS (Cut Lengths ½c lower)	Transformer Grade 72	65	58	52
BeechBottom W10 (cut lengths)	10.95	11.50	12.20	13.00
Brackenridge,Pa. A4	11.45	....	....	....
Newport,Ky. N9 (cut lengths)	10.95	....	....	....
Vandergrift,Pa. U5 (cut lengths)	*11.00*	*12.15*	*12.65*	*13.65*
Warren,O. R2	11.45	....	....	....
Zanesville,O. A10	11.45	12.00	12.70	13.50

C.R. COILS AND CUT LENGTHS, SILICON (22 Ga.)	T-100	T-90	T-80	T-73
Butler,Pa. A10			*16.05*	*16.55*
Vandergrift,Pa. U5 (cut lengths)	*13.65*	*14.65*	*16.25*	*16.75*

TIN MILL PRODUCTS

TIN PLATE Electrolytic (Base Box)	0.25 lb	0.50 lb	0.75 lb
Aliquippa,Pa. J5	$7.40	$7.65	$8.05
Fairfield,Ala. T2	7.50	7.75	8.15
Fairless,Pa. U5	7.50	7.75	8.15
Gary,Ind. U5	7.40	7.65	8.05
GraniteCity,Ill. G4	7.60	7.85	8.25
IndianaHarbor,Ind. I-2, Y1	7.40	7.65	8.05
Irvin,Pa. U5	7.40	7.65	8.05
Niles,O. R2	7.40	7.65	8.05
Pittsburg,Calif. C11	8.15	8.40	8.80
SparrowsPoint,Md. B2	7.50	7.75	8.15
Weirton,W.Va. W6	7.40	7.65	8.05
Yorkville,O. W10	7.40	7.65	8.05

TIN PLATE, American 1.25 1.50 Coke (Base Box)	lb	lb
Aliquippa,Pa. J5	$8.70	$8.95
Fairfield,Ala. T2	8.80	9.05
Fairless,Pa. U5	8.80	9.05
Gary,Ind. U5	8.70	8.95
Ind.Har. I-2, Y1	8.70	8.95
Irvin,Pa. U5	8.70	8.95
Pitts.,Cal. C11	9.45	9.70
Sp.Pt.,Md. B2	8.80	9.05
Warren,O. R2	8.70	8.95
Weirton,W.Va.W6	8.70	8.95
Yorkville,O. W10	8.70	8.95

BLACK PLATE (Base Box)	
Aliquippa,Pa. J5	$6.50
Fairfield,Ala. T2	6.60
Fairless,Pa. U5	6.60
Gary,Ind. U5	6.50
GraniteCity,Ill. G4	6.70
Ind.Harbor,Ind. I-2, Y1	6.50
Irvin,Pa. U5	6.50
Niles,O. R2	6.50
Pittsburg,Calif. C11	7.25
SparrowsPoint,Md. B2	6.60
Warren,O. R2	6.50
Weirton,W.Va. W6	6.50
Yorkville,O. W10	6.50

HOLLOWARE ENAMELING Black Plate (29 gage)	
Follansbee,W.Va. F4	6.10
Gary,Ind. U5	6.10
GraniteCity,Ill. G4	6.30
Ind.Harbor,Ind. Y1	6.10
Irvin,Pa. U5	6.10
Yorkville,O. W10	6.10

MANUFACTURING TERNES (Special Coated)	
Fairfield,Ala. T2	$7.85
Gary,Ind. U5	7.75
Irvin,Pa. U5	7.75
Yorkville,O. W10	7.75

MANUFACTURING TERNES, 8 lb (Commercial Quality)	
Gary,Ind. U5	$9.75
Yorkville,O. W10	9.75

MANUFACTURING TERNES, LT. Coated, 6 lb	
Yorkville,O. W10	$8.65

ROOFING SHORT TERNES (8 lb Coated)	
Gary,Ind. U5	9.75

—WIRE—

WIRE, Manufacturers Bright, Low Carbon	
AlabamaCity,Ala. R2	5.525
Aliquippa,Pa. J5	5.525
Alton,Ill. L1	5.70
Atlanta A11	5.725
Bartonville,Ill. K4	5.625
Buffalo W12	5.525
Chicago W13	5.525
Cleveland A7, C20, R2	5.525
Crawfordsville,Ind. M8	5.625
Donora,Pa. A7	5.525
Duluth,Minn. A7	5.525
Fairfield,Ala. T2	5.525
Fostoria,O. (24) S1	5.75
Houston S5	5.925
Jacksonville,Fla. M8	*6.05*
Johnstown,Pa. B2	5.525
Joliet,Ill. A7	5.525
KansasCity,Mo. S5	6.125
Kokomo,Ind. C16	5.625
LosAngeles B3	6.475
Minnequa,Colo. C10	5.775
Monessen,Pa. P7	5.525
No.Tonawanda B11	5.525
Palmer,Mass. W12	5.825
Pittsburg,Calif. C11	6.475
Portsmouth,O. P12	5.525
Rankin,Pa. A7	5.525
So.Chicago,Ill. R2	5.525
So.SanFranciso C10	6.475
SparrowsPoint,Md. B2	5.625
Sterling,Ill. (1) N15	5.525
Struthers,O. Y1	5.525
Waukegan,Ill. A7	5.525
Worcester,Mass. A7	5.825

WIRE, MB Spring, High Corbon	
Aliquippa,Pa. J5	6.925
Alton,Ill. L1	7.10
Bartonville,Ill. K4	7.025
Buffalo W12	6.925
Cleveland A7	6.925
Donora,Pa. A7	6.925
Duluth,Minn. A7	6.925
Fostoria,O. S1	6.925
Johnstown,Pa. B2	6.925
LosAngeles B3	7.875
Millbury,Mass. (12) N6	7.225
Minnequa,Colo. C10	7.175
Monessen,Pa. P7	6.925
Monessen,Pa. P16	6.925
Muncie,Ind. I-7	7.125
Palmer,Mass. W12	7.225
Pittsburg,Calif. C11	7.875
Portsmouth,O. P12	6.925
Roebling,N.J. R5	7.225
So.Chicago,Ill. R2	6.925
So.SanFran. C10	7.875
SparrowsPt.,Md. B2	7.025
Struthers,O. Y1	6.925
Trenton,N.J. A7	7.225
Waukegan,Ill. A7	6.925
Worcester A7, J4	7.225
Worcester T6, W12	7.225

WIRE, Upholstery Spring	
Aliquippa,Pa. J5	6.625
Alton,Ill. L1	6.80
Buffalo W12	6.625
Cleveland A7	6.625
Donora,Pa. A7	6.625
Duluth,Minn. A7	6.625
Johnstown,Pa. B2	6.625
LosAngeles B3	7.575
Minnequa,Colo. C10	6.80
Monessen,Pa. P7, P16	6.625
NewHaven,Conn. A7	6.925
Palmer,Mass W12	6.925
Pittsburg,Calif. C11	7.575
Portsmouth,O. P12	6.625
Roebling,N.J. R5	6.925
So.Chicago,Ill. R2	6.625
So.SanFrancisco C10	7.575
SparrowsPoint,Md. B2	6.725
Trenton,N.J. A7	6.925
Waukegan,Ill. A7	6.625
Worcester,Mass. A7	6.925

WIRE, Fine & Weaving(8" Coils)	
Alton,Ill. L1	10.75
Bartonville,Ill. K4	10.65
Buffalo W12	10.55
Chicago W13	10.55
Cleveland A7	10.55
Crawfordsville,Ind. M8	*10.65*
Fostoria,O. S1	10.55
Jacksonville,Fla. M8	*11.08*
Johnstown,Pa. B2	10.55
Kokomo,Ind. C16	10.55
Minnequa,Colo. C10	10.30
Monessen,Pa. P16	10.55
Muncie,Ind. I-7	10.75
Palmer,Mass .W12	10.85
Roebling,N.J. R5	10.85
So.SanFrancisco C10	10.90
Waukegan,Ill. A7	10.55
Worcester,Mass. A7, T6	10.85

WIRE, Galv'd ACSR for Cores	
Bartonville,Ill. K4	9.50
Buffalo W12	9.50
Johnstown,Pa. B2	9.50
Minnequa,Colo. C10	9.625
Monessen,Pa. P16	9.50
Muncie,Ind. I-7	9.70
Roebling,N.J. R5	9.80
SparrowsPt.,Md. B2	9.60

ROPE WIRE (A)	
Alton,Ill. L1	9.45
Bartonville,Ill. K4	9.35
Buffalo, W12	9.35
Fostoria,O. S1	9.35
Johnstown,Pa. B2	9.35
Monessen,Pa. P7, P16	9.35
Muncie,Ind. I-7	9.55
Palmer,Mass W12	9.65
Portsmouth,O. P12	9.35
Roebling,N.J. R5	9.65
SparrowsPt. B2	9.45
Struthers,O. Y1	9.35
Worcester J4, T6	9.65

(A) Plow and Mild Plow; add 0.25c for improved plow.

WIRE, Tire Bead	
Alton,Ill. L1	12.75
Bartonville,Ill. K4	12.65
Monessen,Pa. P16	12.55
Roebling,N.J. R5	12.85

WIRE, Cold-Rolled Flat	
Anderson,Ind. G6	7.45
Buffalo W12	7.45
Cleveland A7	7.45
Crawfordsville,Ind. M8	7.55
Dover,O. G6	7.45
Fostoria,O. S1	7.45
Kokomo,Ind. C16	7.55
FranklinPark,Ill. T6	7.60
Massillon,O. R8	7.45
Monessen Pa. P7, P16	7.45
Pawtkt.,R.I.(12) N8	7.75
Trenton,N.J. R5	7.75
Worcester A7, T6, W12	7.75

WIRE, Merchant Quality (6 to 8 gage)	An'ld. Galv.
Ala.City R2	6.675 7.075**
Aliquippa J5	6.675 7.20*
Atlanta A11	6.775 7.30
Bartonville(19)K4	6.675 7.225
Buffalo W12	6.675 7.075†
Cleveland A7	6.675 ....
Crawfordsville M8	6.775 7.30
Donora,Pa. A7	6.675 7.075†
Duluth,Minn. A7	6.675 7.075†
Fairfield T2	6.675 7.075†
Houston,Tex. S5	7.075 7.475
Jacksonville,Fla. M8	*7.20 7.74*
JohnstownB2(48)	6.675 7.225*
Joliet,Ill. A7	6.675 7.075†
KansasCity,Mo. S5	7.275 7.675
Kokomo C16	6.775 7.175
LosAngeles B3	7.625 ....
Minnequa C10	6.925 7.325**
Monessen P7(48)	6.675 7.225
Palmer W12	6.975 7.375†
Pitts.,Calif. C11	7.625 8.025†
Rankin A7	6.675 7.075†
So.Chi'go R2	6.675 7.075**
S.S.Frn.(48)C10	7.625 8.025**
Spar'wsPt.B2(48)	6.775 7.325*
Steri'g(1)(48)	N15 6.675 7.20
Struthers,O.	Y1..6.675 7.175
Worcester A7	6.975 ....

* Based on 10c zinc; † 5c zinc; ** Subject to zinc equalization extras.

WOVEN FENCE, 9-15½ Ga. Col.	
Ala.City,Ala. R2	140**
Ala.City, 17 ga. R2	235**
Ala.City 18 ga. R2	245**
Alip'ppa,Pa.9-14½ga. J5	143*
Atlanta A11	145
Bartonville,Ill. (19) K4	143
Crawfordsville,Ind. M8	145
Donora,Pa. A7	140†
Duluth,Minn. A7	140†
Fairfield,Ala. T2	140†
Houston,Tex. S5	148
Johnstown,Pa. B2	143
Johnstown 17 ga..6"B2	234
Johnstown 4" B2	237
Joliet, Ill. A7	140†
KansasCity,Mo. S5	152
Kokomo,Ind. C16	142
Minnequa,Colo. C10	148**
Monessen,Pa. 9 ga. P7	145
Pittsburg,Calif. C11	163†
Rankin,Pa. A7	140†
So.Chicago,Ill. R2	140**
Sterling,Ill. (1) N15	143

† Based on 5c zinc; * 11c zinc; ** Subject to zinc equalization extras.

BALE TIES, Single Loop Col.	
AlabamaCity,Ala. R2	149
Atlanta A11	151
Bartonville,Ill.(19) K4	149
Crawfordsville,Ind. M8	151
Donora,Pa. A7	149
Duluth,Minn. A7	149
Fairfield,Ala. T2	149
Joliet,Ill. A7	149
KansasCity,Mo. S5	161
Kokomo,Ind. C16	151
Minnequa,Colo.C10	154
Pittsburg,Calif. C11	173
So.Chicago,Ill. R2	149
So.SanFran.,Calif. C10	173
SparrowsPoint,Md. B2	151
Sterling,Ill.(1) N15	149

WIRE, Barbed Col.	
AlabamaCity R2	153**
Aliquippa J5	150*
Atlanta A11	158
Bartonville,Ill. (19) K4	156
Crawfordsville,Ind. M8	*158*
Donora,Pa. A7	153†
Duluth,Minn A7	153†
Fairfield,Ala. T2	153†
Houston,Tex. S5	161
Johnstown,Pa. B2	156*
Joliet,Ill. A7	153†
KansasCity,Mo. S5	165
Kokomo,Ind. C16	155
Minnequa,Colo. C10	159**
Monessen,Pa. P7	157
Pittsburg,Calif. C11	173†
Rankin,Pa. A7	153†
So.Chicago,Ill. R2	153**
S.SanFrancisco C10	176**
SparrowsPoint,Md. B2	158*
Sterling,Ill. (1) N15	156

† Based on 5c zinc; * 11c zinc; ** Subject to zinc equalization extras.

WIRE, (16 gage)	An'ld. Galv. Stone	Stone
Ala.City R2	12.50	14.05**
Aliquippa J5	12.50	14.30*
Bartonville(19)K4	10.73	12.51
Buffalo W12	12.50	....
Cleveland A7	12.50	....
Crawfordsville M8	12.50	14.30
Fostoria,O. S1	12.60	14.15
Johnstown B2	12.50	14.35*
Kokomo C16	12.60	14.15
Minnequa C10	12.75	14.45**
Palmer,Mass.W12	12.50	14.05†
Pitts.,Calif. C11	12.85	14.40†
SparrowsPt. B2	12.60	14.45*
Sterling(1) N15	12.50	14.30
Waukegan A7	12.50	14.05†
Worcester A7	12.80	....

* Based on 11c zinc; †5c zinc; ** Subject to zinc equalization extras.

NAILS, Stock To dealers & mfrs. (7)	Col.
AlabamaCity,Ala. R2	131
Aliquippa,Pa. J5	131
Atlanta A11	131
Bartonville,Ill. (19) K4	131
Chicago,Ill. W13	131
Cleveland A9	137
Crawfordsville,Ind. M8	133
Donora,Pa. A7	131
Duluth,Minn. A7	131
Fairfield,Ala. T2	131
Galveston,Tex. D7	139
Houston,Tex. S5	139
Johnstown,Pa. B2	131
Joliet,Ill. A7	131
KansasCity,Mo. S5	143
Kokomo,Ind. C16	133
Minnequa,Colo. C10	136
Monessen,Pa. P7	131
Pittsburg,Calif. C11	150
Rankin,Pa. A7	131
So.Chicago,Ill. R2	131
SparrowsPt.,Md. B2	133
Sterling,Ill. (1) N15	131
Worcester,Mass. A7	137

NAILS, CUT (100 lb keg) To dealers (33)	
Conshohocken,Pa. A3	$8.00
Wheeling,W.Va. W10	8.00

STAPLES, Polished Stock To dealers & mfrs. (7)	Col.
AlabamaCity,Ala. R2	133
Aliquippa,Pa. J5	133
Atlanta A11	133
Bartonville,Ill. (19) K4	133
Crawfordsville,Ind. M8	135
Donora,Pa. A7	133
Duluth,Minn. A7	133
Fairfield,Ala. T2	133
Johnstown,Pa. B2	133
Joliet,Ill. A7	133
Kokomo,Ind. C16	135
Minnequa,Colo. C10	138
Monessen,Pa. P7	133
Pittsburg,Calif. C11	152
Rankin,Pa. A7	133
So.Chicago,Ill. R2	133
SparrowsPt.,Md. B2	135
Sterling,Ill. (1) N15	133
Worcester,Mass. A7	139

—FENCE POSTS—

	Col.
ChicagoHts.,Ill. C2, I-2	145
Duluth,Minn. A7 (49)	145
Franklin,Pa. F5	145
Johnstown,Pa. B2	145
Marion,O. P11	145
Minnequa, Colo. C10	150
Moline,Ill. R2	145
So.Chicago,Ill. R2	145
Tonawanda,N.Y. B12	148
Williamsport,Pa. S19	158

SEAMLESS STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Sizes—Inches	2		2½		3		3½		4		5		6	
List Per Ft	37c		58.5c		76.5c		92c		$1.09		$1.48		$1.92	
Pounds Per Ft	3.68		5.82		7.62		9.20		10.89		14.81		19.18	
	Blk	Galv	Blk	Galv	Blk	Galv	Blk	Galv	Blk	Galv	Blk	Galv	Blk	Galv
Aliquippa, Pa. J5 (‡)	15.75	list	19.75	2.5	22.25	5	23.75	6.5	23.75	6.5	23	5.75	25.5	8.25
Ambridge, Pa. N2 (†)	15.75	...	19.75	...	22.25	...	23.75	...	23.75	...	23	...	25.5	...
Lorain, O. N3 (*)	15.75	4.5	19.75	5.5	22.25	8	23.75	9.5	23.75	9.5	23	8.75	25.5	11.25
Youngstown Y1 (††)	15.75	list	19.75	2.5	22.25	5	23.75	6.5	23.75	6.5	23	5.75	25.5	8.25

ELECTRIC WELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Youngstown R2 (**)	15.75	0.75	19.75	3	22.25	5.5	23.75	7	23.75	7	23	6.25	25.5	8.75

BUTTWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Sizes—Inches	⅛		¼		⅜		½		¾		1		1¼		1½	
List Per Ft	5.5c		6c		6c		8.5c		11.5c		17c		23c		27.5c	
Pounds Per Ft	0.24		0.42		0.57		0.85		1.13		1.68		2.28		2.73	
	Blk	Galv	Blk	Galv	Blk	Galv	Blk	Galv	Blk	Galv	Blk	Galv	Blk	Galv	Blk	Galv
Aliquippa, Pa. J5 (‡)	...	...	...	...	...	...	26.25	10	29.25	14	31.75	17.5	34.25	18.5	34.75	19.5
Alton, Ill. L1 (§)	...	...	...	...	...	...	24.25	9	27.25	13	29.75	16.5	32.25	17.5	32.75	18.25
Benwood, W. Va. W10(††)	25.5	+0.25	17.75	+5.5	10.25	+10	26.25	11	29.25	15	31.75	18.5	34.25	19.5	34.75	20.26
Butler, Pa. F6 (†)	26.5	+2.75	19.5	+7.25	12.5	+13	...	...	...	...	...	...	...	...	...	...
Etna, Pa. N2 (†)	...	...	...	...	...	...	26.25	7	29.25	11	31.75	14.5	34.25	16.25	34.75	17.25
Fontana, Calif. K1 (§)	...	...	...	...	...	...	13.25	+3	16.25	1	18.75	4.5	21.25	5.5	21.75	6.5
Ind. Harbor Y1 (††)	...	...	...	...	...	...	25.25	9	28.25	13	30.75	16.5	33.25	17.5	33.75	18.5
Lorain, O. N3 (*)	...	...	...	...	...	...	26.25	16	29.25	20	31.75	23.5	34.25	23	34.75	24
Sharon, Pa. S4 (‡)	26.5	—0.25	19.50	+4.25	12.5	+8.5	...	...	...	...	...	...	...	...	...	...
Sharon, Pa. M6	...	...	...	...	...	...	26.25	11	29.25	15	31.75	18.5	34.25	19.25	34.75	20.25
Sparrows Pt., Md. B2 (§)	24.5	+1.75	17.5	+6.25	10.5	+10.5	24.25	8	27.25	12	29.75	15.6	32.25	16.5	32.75	17.5
Youngstown R2 (**)	...	...	...	...	...	...	26.25	11	29.25	15	31.75	18.6	34.25	19.25	34.75	20.25
Youngstown Y1 (††)	...	...	...	...	...	...	26.25	10	29.25	14	31.75	17.5	34.25	18.6	34.75	19.5
Wheatland, Pa. W9 (‡)	24.5	+1.75	17.5	+6.25	10.5	+10.5	26.25	10	29.25	14	31.75	17.5	34.25	18.6	34.75	19.5

Size—Inches	2		2½		3		3½		4	
List Per Ft	37c		58.5c		76.5c		92c		$1.09	
Pounds Per Ft	3.68		5.82		7.62		9.20		10.89	
	Blk	Galv	Blk	Galv	Blk	Galv	Blk	Galv	Blk	Galv
Aliquippa, Pa. J5 (‡)	35.25	20	36.75	20	36.75	20	...	...	...	...
Alton, Ill. L1 (§)	33.25	18.75	34.75	18	34.75	18	...	...	...	...
Benwood, W.Va. W10(††)	35.25	20.75	36.75	20.5	36.75	20.5	27.75	11	27.75	11
Etna, Pa. N2 (†)	35.25	17.25	36.75	18.5	36.75	18.5	27.75	9	27.75	9
Fontana, Calif. K1 (§)	22.25	7	23.75	7	23.75	7	...	...	...	...
Ind. Harbor, Ind. Y1 (††)	34.25	19	35.75	19	35.75	19	...	...	...	...
Lorain, O. N3 (*)	35.25	24.5	36.75	23	36.75	23	...	...	...	...
Sharon, Pa. M6	35.25	20.75	36.75	20.5	36.75	20.5	...	...	...	...
Sparrows Pt., Md. B2 (§)	32.25	18	34.75	18	34.75	18	25.75	8.5	25.75	8.5
Youngstown R2 (**)	35.25	20.75	36.75	20.5	36.75	20.5	27.75	11	27.75	11
Youngstown Y1 (††)	35.25	20	36.75	20	36.75	20	...	...	...	...
Wheatland, Pa. W9 (‡)	35.25	20	36.75	20	36.75	20	...	...	...	...

Galvanized pipe discounts based on zinc price of: (†), 14c; (‡), 11c to under 12c; (*), 5c; (§), 10c to under 11c; (††), 10.50c-11.50c; with discounts adjusted on price of zinc at time of shipment.

BOILER TUBES

Net base c.l. prices, dollar per 100 ft, mill; minimum wall thickness, cut lengths 10 to 24 ft, inclusive.

O.D. In.	B.W. Gage	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.
1	13	...	21.31	18.44
1¼	13	...	25.24	18.12
1½	13	23.12	27.89	20.01
1¾	13	26.84	32.37	23.66
2	13	30.08	36.28	26.51
2¼	13	34.18	41.23	29.86
2½	12	37.10	44.75	32.41
2½	12	40.51	48.86	35.70
2¾	12	43.85	52.90	38.66
3	12	45.92	55.39	41.23

RAILWAY MATERIALS

RAILS	Std. No. 1	Std. No. 2	All No. 2	Tee Rails 60 lb Under
Bessemer,Pa. U5	4.325	4.225	4.275	5.20
Ensley,Ala. T2	4.325	4.225	....	5.20
Fairfield,Ala. T2	....	....	....	5.20
Gary,Ind. U5	4.325	4.225	4.275	....
Huntington,W.Va. W7	....	....	....	5.20
IndianaHarbor,Ind. I-2	4.325	4.225	4.275	....
Johnstown,Pa. B2	....	....	....(16)	5.20
Lackawanna,N.Y. B2	4.325	4.225	....	5.20
Minnequa,Colo. C10	4.325	4.125	....	5.70
Steelton,Pa. B2	4.325	4.225	....	....
Williamsport,Pa. S19	....	....	....	5.20

TIE PLATES	
Fairfield,Ala. T2	5.125
Gary,Ind. U5	5.125
Ind.Harbor,Ind. I-2	5.125
Lackawanna,N.Y. B2	5.125
Minnequa,Colo. C10	5.125
Pittsburg,Calif. C11	5.275
Seattle B3	5.275
Steelton,Pa. B2	5.125
Torrance,Calif. C11	5.275

TRACK BOLTS (20) Treated	
Cleveland R2	11.00
KansasCity,Mo. S5	11.00
Lebanon,Pa. B2	11.00
Minnequa,Colo. C10	11.00
Pittsburgh-O3, P14	11.00

JOINT BARS	
Bessemer,Pa. U5	5.275
Fairfield,Ala. T2	5.275
Ind.Harbor,Ind. I-2	5.275
Joliet,Ill. U5	5.275
Lackawanna,N.Y. B2	5.275
Minnequa,Colo. C10	5.275
Steelton,Pa. B2	5.275

AXLES	
Ind.Harbor,Ind. S13	6.50
Johnstown,Pa. B2	6.50

STANDARD TRACK SPIKES	
Ind.Harbor,Ind. I-2, Y1	7.05
KansasCity,Mo. S5	7.30
Lebanon,Pa. B2	7.05
Minnequa,Colo. C10	7.05
Pittsburgh J5	7.05
Seattle B3	7.55
So.Chicago,Ill. R2	7.05
Struthers,O. Y1	7.05
Youngstown R2	7.05

RIVETS

F.o.b. Cleveland, and/or freight equalized with Pittsburgh, f.o.b. Chicago, and/or freight equalized with Birmingham except where equalization is too great.

Structural ½-in. larger 8.90c
⅞-in. under ..... 26.5 off

WASHERS, WROUGHT

F.o.b. shipping point to jobbers ..... List

BOLTS, NUTS

CARRIAGE, MACHINE BOLTS

(F.o.b. midwestern plants, per cent off list for less than case lots to consumers)

6 in. and shorter:	
½-in. & smaller diam.	4
⅝-in. & ⅝-in.	5
¾-in. and larger	3
Longer than 6 in.:	
All diams.	+4
Lag bolts, all diams.:	
6 in. and shorter	12
Over 6 in. long	8
Ribbed Necked Carriage	5
Blank	25
Plow	25
Step, Elevator, Tap and Sleigh Shoe	12
Tire Bolts	List
Boiler & Fitting-Up Bolts	23

NUTS

H.P. & C.P., regular & heavy:	
Square, all sizes	58
H.P. Hex, regular & heavy:	
¾" and smaller	58
⅞" to 1⅛", inclusive	60
1¼" to 1½", inclusive	62
1⅝" and larger	58
C.P. Hex, regular heavy:	
All sizes	58
Hot Galv. Nuts (all types):	
¾" and smaller	40
⅞" to 1½", inclusive	43
Finished Hex Nuts:	
New standard, all sizes	58
Semifinished & Slotted Hex.:	
Regular and heavy, all sizes	58

SQUARE HEAD SET SCREWS

(Packaged; per cent off list)

1 in. diam x 6 in. and shorter	34
1 in. and smaller diam. x over 6 in.	20

HEADLESS SET SCREWS

(Packaged; per cent off list)

No. 10 and smaller	34
¼-in. diam. & larger	14
N.F. thread, all diams.	8

STEEL STOVE BOLTS

(F.o.b. plant, per cent off list in packages)

Plain finish	47.5 & 10
Plated finishes	30 x 10

HEXAGON CAP SCREWS

(1020 steel; packaged; per cent off list)

6 in. or shorter:	
⅝-in. & smaller	38
¾-in. through 1 in.	22
Longer than 6 in.:	
⅝-in. and smaller	20
¾-in. through 1 in.	7

METAL POWDERS

(Per pound, f.o.b. shipping point in ton lots for minus 100 mesh, except as otherwise noted)

	Cents
Sponge iron:	
98+% Fe, annealed	18.00
Unannealed	14.50
Swedish, c.i.f. N.Y., c.l., in bags	11.25
Electrolytic iron:	
Annealed, 99.5% Fe	42.50
Unannealed (99+% Fe)	36.50
Unannealed (99+% Fe), (minus 325 mesh)	53.50
Powder Flakes (minus 16, plus 100 mesh)	31.00
Carbonyl Iron:	
97.9-99.8% size 5 to 10 microns	83.00-148.00
Aluminum:	
Atomized, 500 lb drums, freight allowed:	
Carlots	31.00
Ton lots	34.00
Antimony, 500 lb lots	32.00*
Brass, 20-ton lots	29.25-36.50
Bronze, 10-ton lots	51.00-60.00
Copper:	
Electrolytic	13.50*
Reduced	13.50*
Lead	7.50*
Magnesium	75.00-85.00
Manganese:	
Minus 35 mesh	61.00
Minus 100 mesh	67.00
Minus 200 mesh	72.00
Nickel unannealed	89.50
Nickel-Silver 5-ton lots	47.00
Silicon	43.50
Solder	8.50*
Stainless Steel, 302	91.00
Tin	14.00*
Zinc, 10-ton lots	17.50-25.00
Tungsten	Dollars
Melting grade, 99% 60 to 200 mesh:	
1000 lb and over	5.35
Less than 1000 lb	5.50
Chromium, electrolytic 99.9% Cr min.	3.60

*Plus cost of metal.

Footnotes

(1) Chicago base.
(2) Angles, flats, bands.
(3) Merchant.
(4) Reinforcing.
(5) 1⅝" to 1 7/16"; 1 7/16" to 1 15/16" 4.58c; 1 15/16" to 2 5/16" 4.95c.
(6) Chicago or Birm. base.
(7) To jobbers, 3 cols. lower.
(8) 16 gage and heavier.
(9) 6 in. and narrower.
(10) Pittsburgh base.
(11) Cleveland & Pitts. base.
(12) Worcester, Mass. base.
(13) Add 0.25c for 17 Ga. & heavier.
(14) Gage 0.143 to 0.249 in.; for gage 0.142 and lighter, 5.80c.
(15) 3/8" and thinner.
(16) 40 lb and under.
(17) Flats only; 0.25 in. & heavier.
(18) To dealers.
(19) Chicago & Pitts. base.
(20) 0.25c off for untreated.
(21) New Haven, Conn., base.
(22) Del. San Francisco Bay area.
(23) 20 Ga. 36" wide.
(24) Deduct 0.10c, finer than 15 Ga.
(25) Bar mill bands.
(26) Reinforcing mill lengths, to fabricators; to consumers, 5.40c.
(27) Bar mill sizes.
(28) Bonderized.
(29) Youngstown base.
(30) Sheared; add 0.35c for universal mill.
(31) Base; deld. within mill county.
(32) To jobbers, deduct 20c.
(34) 2.60c for cut lengths.
(35) 72" and narrower.
(36) 54" and narrower.
(37) 13 gage & lighter; 60" & narrower.
(38) 14 gage & lighter; 48" and narrower.
(39) 46" and narrower.
(40) Lighter than 0.035"; 0.035" and heavier, 0.25c higher.
(41) 2.10c for cut lengths.
(48) 6-7 gage.
(49) T-post; deduct 2 cols. for U-post.

STAINLESS STEEL MILL PRICES

(Representative prices, cents per pound; subject to current lists of extras)

AISI Type	Rerolling Ingots	Rerolling Slabs, Billets	Forging Billets	Seamless Tube Billets	H.R. Strip	Shapes; H.R. & C.F. Bars; Wire	Plates	Sheets	C.R. Strip; Flat Wire
301	16.25	20.50	29.50	34.25	29.75	35.25	37.25	46.25	38.25
302	17.25	22.75	29.75	34.50	32.00	35.50	37.50	46.50	41.50
302B	18.50	24.50	30.50	34.50	35.00	35.50	37.50	48.75	44.75
303	18.75	24.75	32.25	37.25	36.75	38.25	39.75	48.75	45.50
304	18.25	23.75	31.00	36.00	34.25	37.25	39.75	48.75	43.75
304L	....	....	36.75	....	....	42.75	45.25	54.25	49.00
306	19.50	25.50	....	36.25	37.00	37.50	42.00	51.75	46.75
308	19.75	26.25	35.25	40.75	38.00	42.00	46.00	55.25	48.00
309	26.50	34.75	43.25	49.25	49.25	50.50	53.75	63.50	62.00
309S	28.50	37.50	47.50	54.50	54.00	55.50	59.00	68.50	68.50
310	33.00	43.25	56.75	66.25	67.50	67.50	69.00	72.25	78.75
314	....	....	....	....	....	....	69.00	74.50	....
316	28.00	36.25	46.75	54.50	55.00	55.50	59.00	64.50	66.50
316L	....	....	52.50	....	....	61.00	64.25	70.00	72.00
317	33.00	43.50	58.25	66.75	67.50	68.25	70.75	77.00	79.25
318	33.50	44.00	55.25	64.50	66.25	65.50	68.75	78.00	80.25
321	22.75	29.50	35.25	40.75	42.00	42.00	46.00	55.50	54.50
330	....	....	58.00	....	....	68.50	70.00	73.75	77.75
347	24.50	32.25	39.50	45.75	46.50	46.75	51.25	60.75	59.25
403	....	....	27.00	30.75	....	32.00	34.25	44.00	41.25
405	16.50	21.75	25.25	29.25	30.50	30.25	31.75	42.50	39.75
410	14.00	18.25	24.00	27.75	26.25	28.75	30.00	40.75	34.25
416	....	....	24.50	28.25	....	29.25	30.50	41.25	41.25
420	22.00	28.50	29.25	34.00	35.50	35.00	38.50	49.25	52.75
430	14.25	18.50	24.50	28.25	27.00	29.25	30.50	43.50	34.75
430F	....	18.75	25.00	28.75	....	29.75	31.00	44.00	44.00
431	14.50	28.50	25.00	28.25	27.50	29.25	30.50	44.00	35.25
440A,B,C	....	28.50	29.25	34.00	....	35.00	38.50	49.25	52.75
442	....	....	28.00	....	....	30.50	35.25	48.25	47.75
446	....	....	33.75	38.25	53.00	39.50	40.75	59.75	71.00
501	....	....	14.00	14.50	21.25	16.00	18.25	30.50	29.00
502	....	....	15.25	16.00	22.25	17.00	20.00	31.75	30.00

Stainless Steel Producers Are: Allegheny Ludlum Steel Corp.; Alloy Metal Wire Co. Inc.; American Steel & Wire Div., U. S. Steel Corp.; Armco Steel Corp.; Babcock & Wilcox Co.; Bethlehem Steel Co.; J. Bishop & Co.; G. O. Carlson Inc.; Carpenter Steel Co.; Charter Wire Products Co.; Cold Metal Products Co.; Crucible Steel Co. of America; Damascus Tube Co.; Wilbur B. Driver Co.; Driver-Harris Co.; Eastern Stainless Steel Corp.; Ellwood Ivins Steel Tube Works Inc.; Firth Sterling Inc.; Ft. Wayne Metals Inc.; Globe Steel Tubes Co.; Helical Tube Co.; Indiana Steel & Wire Co.; Ingersoll Steel Div., Borg Warner Corp.; Jessop Steel Co.; Johnson Steel & Wire Co. Inc.; Joslyn Mfg. & Supply Co.; Kenmore Metals Corp.; Maryland Fine & Specialty Wire Co.; McLouth Steel Corp.; Metal Forming Corp.; McInnes Steel Co.; National-Standard Co.; National Tube Div., U. S. Steel Corp.; Newman-Crosby Steel Co.; Pacific Tube Co.; Page Steel & Wire Div. American Chain & Cable Co. Inc.; Pittsburgh Rolling Mills Inc.; Republic Steel Corp.; Rodney Metals Inc.; Rome Mfg. Co.; Rotary Electric Steel Co.; Sharon Steel Corp.; Shenango Agaloy Tube Co.; Simonds Saw & Steel Co.; Specialty Wire Co. Inc.; Spencer Wire Corp.; Stainless Welded Products Inc.; Standard Tube Co.; Superior Steel Corp.; Superior Tube Co.; Timken Roller Bearing Co.; Trent Tube Co.; Tube Methods Inc.; United States Steel Corp.; Universal-Cyclops Steel Co.; Wallingford Steel Co.; Washington Steel Corp.

CLAD STEEL

Cladding Stainless	Plates: Carbon Base 10%	Plates: Carbon Base 20%	Sheets: Carbon Base 20%	Sheets: Copper Base Both Sides
302	....	31.00	31.00	77.00
304	27.60	32.50-32.70	32.50	77.00
310	36.50	41.00	....	144.00
316	32.60	37.70-42.75	42.75	....
318	37.00	42.20	....	....
321	29.30	34.40-37.00	37.00	111.00
347	30.40	35.50-40.50	40.50	130.00
405	23.40	30.60	....	....
410	22.90	30.10	....	....
430	22.90	30.10	....	....
Inconel	41.23	54.18	....	165.00
Nickel	37.50	50.90	....	....
Monel	38.90	51.80	....	....
Copper*	....	....	46.00	....

	Strip, Carbon Base: Cold-Rolled 10%	Cold-Rolled Both Sides	Hot-Rolled 10%	Hot-Rolled Both Sides
Copper*	27.85	35.85	24.00	32.25

*Deoxidized. Production points: Stainless sheets, New Castle, Ind. I-4; stainless-clad plates, Claymont, Del. C22, Coatesville, Pa. L7, New Castle, Ind. I-4 and Washington, Pa. J3; nickel, inconel, monel-clad plates Coatesville L7; copper-clad strip, Carnegie, Pa. S18. Production point for copper-base sheets is Carnegie, Pa. A13.

TOOL STEEL

Grade	$ per lb	Grade	$ per lb
Regular Carbon	0.25-.285	5% Cr Hot Work	0.39
Extra Carbon	0.30-.340	W-Cr Hot Work	0.41
Special Carbon	0.35-.360	V-Cr Hot Work	0.43
Oil Hardening	0.370-.39	Hi-Carbon-Cr.	0.665-.70

Grade by Analysis (%) W	Cr	V	Co	Mo	$ per lb
20.25	4.25	1.6	12.25	....	4.055
18.25	4.25	1	4.75	....	2.340
18	4	2	9	....	2.565-2.695
18	4	2	....	....	1.820
18	4	1	....	....	1.580-1.660
13.5	4	3	....	....	1.875
6.4	4.5	1.9	....	5	1.065
6	4	3	....	6	1.300
2	1.4	1.2	....	....	0.495
1.5	4	1	....	8.5	0.895

Tool steel producers include: A4, A8, B2, B8, C4, C9, C13, C18, D4, F2, J3, L3, M14, S8, U4, V2 and V3.

PIG IRON Gross Ton

F.o.b. furnace prices in dollars per gross ton, as reported to STEEL. Minimum delivered prices are approximate and do not include 3% federal tax.

	Basic	No. 2 Foundry	Malleable	Bessemer
Birmingham District				
AlabamaCity R2	52.38	52.88	....	....
Birmingham R2	52.38	52.88	....	....
Birmingham U6	....	52.88	....	....
Woodward,Ala. W15	52.38	52.88	56.50	....
Cincinnati, deld.	....	60.43	....	....
Buffalo District				
Buffalo R2, H1	56.00	56.50	57.00	....
Tonawanda,N.Y. W12	56.00	56.50	57.00	....
No Tonawanda,N.Y. T9	....	56.50	57.00	....
Boston, deld.	66.65	67.15	67.65	....
Rochester,N.Y., deld.	59.02	59.52	60.02	....
Syracuse,N.Y., deld.	60.12	60.62	61.12	....
Chicago District				
Chicago I-3	56.00	56.50	56.50	57.00
Gary,Ind. U5	56.00	....	56.50	....
IndianaHarbor,Ind. I-2	56.00	....	56.50	....
So.Chicago,Ill. W14, Y1	56.00	56.50	56.50	....
So. Chicago,Ill. U5	56.00	....	56.50	57.00
Milwaukee, deld.	58.17	58.67	58.67	59.17
Muskegon,Mich., deld.	....	62.80	62.80	....
Cleveland District				
Cleveland A7	56.00	56.50	56.50	57.00
Cleveland R2	56.00	56.50	56.50	....
Akron,O., deld. from Cleve.	58.75	59.25	59.25	59.75
Lorain,O. N3	56.00	....	....	57.00
Mid-Atlantic District				
Bethlehem,Pa. B2	58.00	58.50	59.00	59.50
New York, deld.	....	62.28	62.78	....
Newark, deld.	61.02	61.52	62.02	62.52
Philadelphia, deld.	60.75	61.25	61.75	62.25
Birdsboro,Pa. B10	58.00	58.50	....	....
Steelton,Pa. B2	58.00	58.50	59.00	59.50
Swedeland,Pa. A3	58.00	58.50	59.00	59.50
Troy,N.Y. R2	58.00	58.50	59.00	....
Pittsburgh District				
NevilleIsland,Pa. P6	56.00	56.50	56.50	57.00
Pittsburgh (N&S sides), Ambridge, Aliquippa, deld.	57.37	57.87	57.87	58.37
McKeesRocks, deld.	57.04	57.54	57.54	58.04
Lawrenceville,Homestead, Wilmerding,Monaca, deld.	57.66	58.16	58.16	58.66
Verona,Trafford, deld.	58.19	58.69	58.69	59.19
Brackenridge, deld.	58.45	58.95	58.95	59.45
Bessemer,Pa. U5	56.00	....	56.50	57.00
Clairton,Rankin,So.Duquesne,Pa. U5	56.00	....	....	....
McKeesport,Pa. N3	56.00	....	....	57.00
Midland,Pa. C18	56.00	....	....	....
Monessen,Pa. P7	56.00	....	....	....
Youngstown District				
Hubbard,O. Y1	....	....	56.50	....
Sharpsville,Pa. S6	56.00	56.50	56.50	57.00
Youngstown Y1	....	....	56.50	57.00
Youngstown U5	56.00	....	....	57.00
Mansfield,O., deld.	60.90	....	61.40	61.90
Duluth I-3	56.00	56.50	56.50	57.00
Erie,Pa. I-3	56.00	56.50	56.50	57.00
Everett,Mass. E1	59.50	63.00	63.50	....
Fontana,Calif. K1	62.00	62.50	....	....
Geneva,Utah C11	56.00	56.50	....	....
GraniteCity,Ill. G4	57.50	58.40	58.90	....
Ironton,Utah C11	56.00	56.50	....	....
LoneStar,Texas L6	52.00	52.50*	52.50	....
Minnequa,Colo. C10	58.00	59.00	59.00	....
Rockwood,Tenn. T3	....	....	56.50	....
Toledo,O. I-3	56.00	56.50	56.50	57.00
Cincinnati, deld.	61.76	62.26	....	....

*Low phos. southern grade. †Phos., 0.30 max.

PIG IRON DIFFERENTIALS

Silicon: Add 50 cents per ton for each 0.25% Si or percentage thereof over base grade, 1.75-2.25%, except on low phos iron on which base is 1.75-2.00%.

Phosphorus: Deduct 38 cents per ton for P content of 0.70% and over.

Manganese: Add 50 cents per ton for each 0.50% manganese over 1% or portion thereof.

Nickel: Under 0.50% no extra; 0.50-0.74%, incl., add $2 per ton and each additional 0.25%, add $1 per ton.

BLAST FURNACE SILVERY PIG IRON, Gross Ton

(Base 6.00-6.50% silicon; add $1.50 for each 0.5% Si; 75 cents for each 0.5% Mn over 1%)

Jackson,O. G2, J1	$67.00
Buffalo H1	68.25

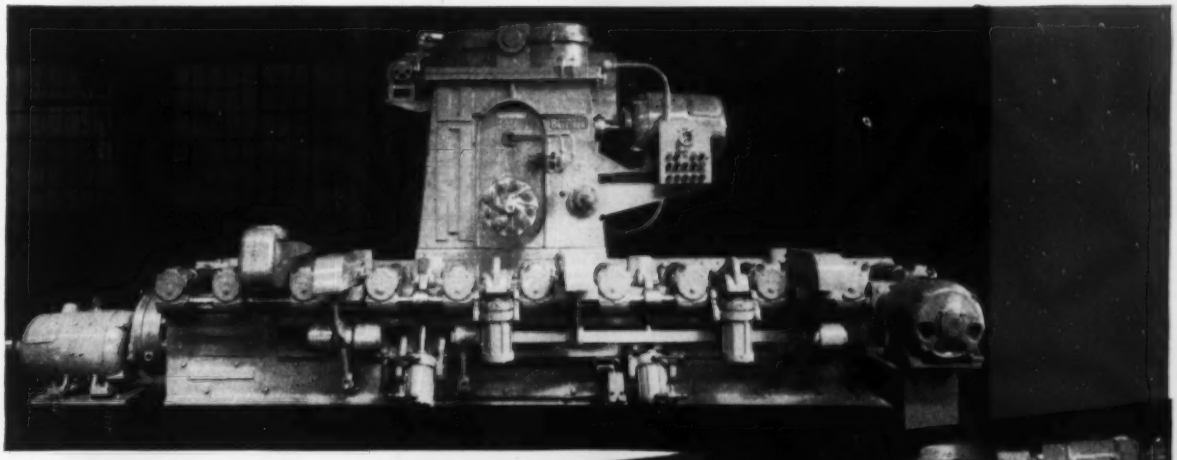
ELECTRIC FURNACE SILVERY PIG IRON, Gross Ton

(Base 14.01-14.50% silicon; add $1 for each 0.5% Si to 18%; $1.45 for each 0.5% Mn over 1%; $2 per gross ton premium for 0.045% max P)

NiagaraFalls,N.Y. P15	$91.00
Keokuk,Iowa, Openhearth & Fdry, freight allowed K2	95.50
Keokuk, OH & Fdry, 12¼ lb piglets, 16% Si, frt. allowed K2	98.50
Wenatchee,Wash. OH & Fdry, freight allowed K2	95.50

LOW PHOSPHORUS PIG IRON, Gross Ton

Cleveland, intermediate, A7	$61.00
Rockwood,Tenn. T3	70.00
Steelton,Pa. B2	64.00
Philadelphia, deld.	67.55
Troy,N.Y. R2	64.00



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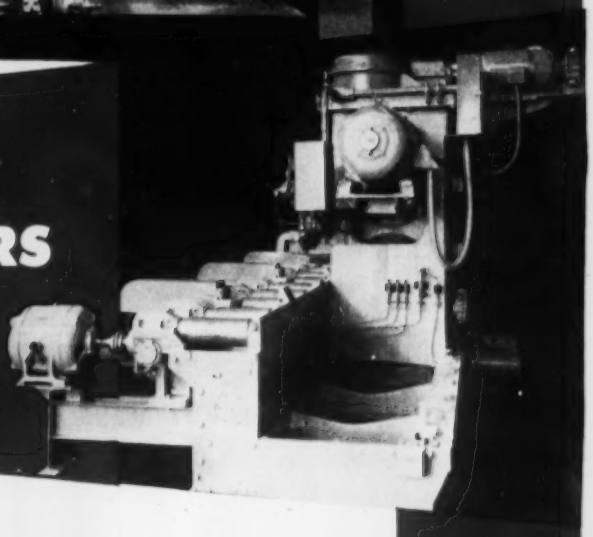

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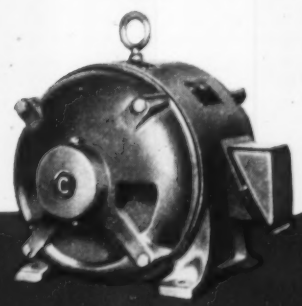

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WAREHOUSE STEEL PRODUCTS

(Representative prices, cents per pound, subject to extras, f.o.b. warehouse. City delivery charges are 20 cents per 100 lb except: New York, 30 cents; Philadelphia, 25 cents; Birmingham, Cincinnati, St. Paul, 15 cents; Seattle and Spokane, Wash., no charge.)

	SHEETS			STRIP		BARS			Standard Structural Shapes	PLATES	
	Hot Rolled	Cold Rolled	Gal. 10 Ga.†	H.R.*	C.R.*	H.R. Rds.	C.F. Rds.‡	H.R. Alloy 4140††[5]		Carbon	Floor
Baltimore	6.20	7.64	7.78	7.00	...	6.86	8.17[6]	12.04	6.98	6.85	7.98
Birmingham	6.10	7.60	8.00[2]	6.30	...	6.15	8.90	....	6.35	6.35	8.65
Boston	6.89	7.83	9.18	7.13	...	6.87	8.35	12.28	7.06	7.13	8.26
Buffalo	6.18	7.15	8.96	6.79	...	6.35	7.70	12.17	6.59	6.68	7.88
Charlotte, N. C.	6.95	7.80	8.69	6.90	...	7.10	8.37	....	7.10	7.10	8.37
Chicago	6.18	7.12	8.00	6.42	...	6.28	7.30	11.75	6.46	6.33	7.46
Cincinnati	6.51	7.19	8.42	6.72	...	6.58	7.66	12.17	6.93	6.80	7.88
Cleveland	6.18	7.12	7.90	6.58	...	6.34	7.40	11.89	6.79	6.50	7.79
Detroit	6.38	7.29	8.27	6.69	7.36	6.56	7.60	11.92	6.90	6.80	7.80
Erie, Pa.	6.19	7.13	9.01	6.54	...	6.28	7.65	....	6.56	6.50	7.79
Houston	7.15	7.60	9.40	7.45	9.30	7.45	9.30	....	7.35	7.20	8.55
JerseyCity,N.J.	6.54	7.45	8.42	6.82	...	6.75	8.43[6]	11.84	6.50	6.67	8.01
Los Angeles	7.25	9.00	9.35	7.55	11.20	7.15	9.10	13.05	7.35	7.20	9.25
Milwaukee	6.35	7.29	8.17	6.59	...	6.45	7.57	11.92	6.63	6.50	7.63
Moline, Ill.	6.53	7.47	8.35	6.77	...	6.63	7.65	....	6.81	6.68	...
New York	6.54	7.45	8.42	6.82	...	6.75	8.43[6]	11.84	6.50	6.67	8.01
Newark, N. J.	6.78	7.75	8.42	7.16	...	7.06	8.43[6]	....	6.90	6.99	8.30
Norfolk, Va.	6.90	...	...	7.20	...	7.20	8.50	....	7.20	7.15	7.85
Philadelphia	6.17	7.13	7.91	7.02	8.80	6.87	8.19[6]	11.89	6.67	6.63	7.65
Pittsburgh	6.18	7.12	8.00	6.55	...	6.28	7.65	11.89	6.46	6.33	7.46
Portland, Oreg.	8.15	8.70	9.40	7.90	...	7.60	10.65	....	7.50	7.55	9.40
Richmond, Va.	6.50	7.45	8.00	7.10	...	7.05	7.95	....	7.10	6.85	8.10
St. Louis	6.48	7.42	8.30	6.72	...	6.58	7.70	12.05	6.86	6.73	7.86
St. Paul	6.84	7.78	8.66	7.08	...	6.94	8.06	....	7.12	6.99	8.12
San Francisco	7.35	8.70	10.15	7.60	...	7.15	9.75	13.05	7.25	7.20	9.25
Seattle	8.15	9.50	9.80	8.00	...	7.60	10.65	13.50	7.50	7.60	9.40
Spokane	8.15	9.40[3]	9.80	7.60	...	7.60	10.55[8]	14.15	7.25	7.35	9.80
Washington	6.71	8.15	8.35	7.51	...	7.37	8.43	....	7.49	7.36	8.49

*Prices do not include gage extras; † prices include gage and coating extras, except Birmingham (coating extra excluded) and Los Angeles (gage extras excluded); ‡ includes 35-cent special bar quality extra; § as rolled; †† as annealed. Base quantities, 2000 to 9999 lb except as noted: Cold-rolled strip, and cold-finished bars, 2000 lb and over, except in Seattle where base is 2000 to 9999 lb and in Erie where base is 1000 lb and over; [2]—500 to 9999 lb; [3]—1000 to 1999 lb; [6]—1000 lb and over; [7]—1500 lb to 3999; [8]—under ½ in.

Distributors Offer Prompt Delivery

Customers' needs can be filled fully in all products, except wide flange beams, since inventories are now back to normal levels. Improvement in sales is expected

Cleveland—Local warehouses expect January order volume will better that of December which was adversely affected by manufacturing curtailments over the holidays. With inventories in better balance than for a number of years past the distributors are in position to satisfy the needs of their customers promptly in most products, one exception being wide flange beams.

Generally, orders are expected to be smaller individually, indications being the mills will get substantial business that over recent years went to the warehouses largely for the reason the mills could not give desired delivery. With steel plentiful at the mill level, customers are expected to divert as much tonnage to the mills as possible, thus saving the warehouse price differential.

Boston—Slight improvement in demand for warehouse steel is indicated this month, but first quarter sales are not likely to match those in the same period last year.

Pattern of warehouse sales is about back to normal. Smaller, but diversified, individual orders are being entertained. To meet demand distributors have better balanced stocks, wide flange structurals excepted. On some products, mill replacements will be kept down to match sales.

Philadelphia—Following a lag in December, especially during the closing two weeks, steel distributors anticipate some gain this month, with further gains in February and March, particularly the latter. Inventories are normal tonnagewise, but not yet completely in balance from the specifications standpoint. Sellers are still shy of wide flange sections.

Chicago—Consumer inventory reduction is throttling warehouse sales. It has been going on for weeks and is carrying over into first quarter. As result, mill receipts outweigh weekly warehouse outgo, and stocks are rising faster than had been anticipated.

Seattle—District warehouse operators report business the last half of December was seasonally slow, but

STEEL IMPORT PRICES

(Base, per 100 lb, landed, duty paid)

	North Atlantic	South Atlantic	Gulf Coast	West Coast
Deformed Bars, Intermediate, ASTM-A-305	$4.65	$4.75	$4.65	$4.90
Bar Size Angles	4.30	4.40	4.30	4.58
Structural Angles	4.30	4.40	4.30	4.58
I-Beams	4.30	4.40	4.30	4.58
Wide Flange Beams	4.94	5.02	4.94	5.22
Sheet and Plate, 10 gage, 11 gage, 5' x 10'	5.87	5.95	5.87	6.25
Furring Channels, C.R., 1000 ft, ¾ x 0.30 lb per ft	25.00	25.70	25.50	26.34
Barbed Wire	6.20	6.30	6.20	6.48
Merchant Bars	4.55	4.65	4.55	4.83
Hot Rolled Bands	4.65	4.75	4.65	4.93
Wire Rods, Thomas Commercial No. 5	4.68	4.75	4.73	5.00
Wire Rods, O-H, Cold Heading Quality No. 5	5.14	5.21	5.19	5.46
Channels	4.40	4.50	4.40	4.68
Bright Common Wire Nails, 8d	6.55	6.65	6.60	6.85

Size O.D.	Wgt/Foot/Lb	Gulf Port	West Coast	Vancouver
Seamless A.P.I. Casing, Grade J-55:				
5½ in.	15.5	$1.47/ft	$1.51/ft	$1.32/ft
7 in.	23	2.10/ft	2.17/ft	1.90/ft
Seamless N-80 Casing:				
5½ in.	17	1.94/ft	2.00/ft	1.75/ft
7 in.	23	2.50/ft	2.70/ft	2.36/ft
Seamless J-55 Tubing:				
2⅜ in.	4.7	0.60/ft	0.63/ft	0.55/ft
2⅞ in.	6.5	0.80/ft	0.83/ft	0.73/ft

Sources of shipment: Western continental European (Schuman Plan) countries.

prices held unchanged. Outlook for first quarter is considered promising with many contracts pending and expected to be closed over the next 30 days.

Cincinnati — Distributors expect business to bounce back this month. December volume was about on a par with that of November. Wide flange structurals, still in short supply, are expected to be more plentiful before end of this quarter.

October Steel Shipments Up

New York—Shipments of finished steel in October totaled 6,726,850 net tons, reports the American Iron & Steel Institute. This was an increase of 326,000 tons over September, but a decrease of 429,000 tons from October, 1952.

Ten months' shipments amounted to 68,598,700 tons, largest for this period in any year, 14.3 million tons above movement in the corresponding months of 1952, and 2.6 million tons greater than in the first 10 months of 1951, the previous record year.

Warehouses held their recently resumed first place as mill customers during the month. They received nearly 1.3 million tons, an increase of nearly 100,000 over September but a decrease of 111,000 from the peak reached in October, 1952.

In the first 10 months this year the warehouses received nearly 12.7 million tons, up nearly 2 million over the 1952 like period.

Through much of the Korean war the distributors edged the automotive industry out of first place as steel buyers, but autos climbed back to that position last March with relaxation of government controls. In October shipments to the auto industry were about 1.1 million tons, and in the 10 months it took 13 million tons, an increase of 4.5 million over the like 1952 period.

Shipment gains for several other industries, including construction, railroads, household equipment and electrical apparatus were also reported in October.

The construction industry took 933,100 tons in the month for a near-record and makers of contractors' products received 335,018 tons, the total for the two being nearly 1.3 million tons. This was an increase of 250,000 over October, 1952, and an increase of 106,000 over September this year. In the first 10 months shipments totaled above 10.9 million tons, an increase of 2.6 million over the like 1952 period.

Purchased Scrap Use Heavy In 1953

Consumption second largest in history but industry's good showing is obscured by depressed state of market in last half of year. Bulk of tonnage comes from metalworking

Scrap Prices, Page 520

Washington — Approximately 32 million gross tons of purchased iron and steel scrap were consumed in 1953 by the nation's steel mills and foundries, reports Edwin C. Barringer, executive vice president, Institute of Scrap Iron & Steel Inc.

This total was second only to the record 33,800,000 tons consumed in 1951. Actual shipments, estimated at 33,500,000 tons, exceeded those of 1951 by a slight margin.

The excellent showing of the industry, however, was obscured by the depressed state of the market during the last six months of the year.

Less Dealer Scrap—Actual melt of purchased scrap was second highest on record, but relatively more industrial and railroad material, and proportionally less dealer scrap was in demand. In four separate months consumption exceeded 3 million gross tons, and in one month, March, an all-time peak of 3,211,000 tons was attained.

Consumers' inventories of purchased and home scrap combined, which opened the year at 4,169,000 tons, closed at an estimated 6,500,000 tons on Dec. 31, a level never before reached.

Prices slipped at least 25 per cent during the year. A modest rise from January to March was followed by a decline through June, after which July rebounded to the peak of the year, only to slide off in some districts as much as $13 per ton by end of December.

Trade Depressed—At close of 1953 scrap was in a depressed state, and the industry, having plowed back the bulk of war and postwar profits into mechanization, was confronted with a burden of overhead and skilled labor which did not permit it to retrench and ride out the storm as easily as in earlier times.

Two highlights stand out for the year. One was restoration of the right to export to friendly nations, and the other was announcement by the Defense Department that many military installations were not warranted in preparing their scrap in competition with the industry, and that such practice would be reviewed and probably largely abolished.

Industry Leading Source—Of total purchased scrap consumption during the year, between 9,500,000 and 10 million tons originated in metalworking factories.

Hydraulic compressed bundles maintained their leadership as the principal grade of scrap in point of tonnage, representing approximately 22 per cent of the total compared with 20 per cent in 1952.

Foreign trade in scrap was negligible during the year. Exports totaled about 300,000 tons and imports a little over 100,000 tons.

Specifications for leading steelmaking grades were tightened during the year and two new grades of bundles—No. 3 and incinerator—were established to provide a home for material not acceptable in superior grades.

Boston — District scrap consumers hold substantial inventories and new buying is not expected to lend support to higher prices. Recovery from the low price levels, once started, is likely to be gradual.

Yards are operating well below capacity in scrap preparation with accumulations of borings and turnings

Pier Protection Plates

Workers of Great Lakes Dredge & Dock Co., Chicago, lower heavy plates into a cofferdam during construction of a bridge at Beardstown, Ill. More than 40 tons of wrought iron plate are used to protect the bridge piers against damage from ice and debris, as well as boats using the Illinois waterway

precision *beyond question*

The requirements exacted of surface grinding machines leave no room for variation. Precision and tolerance control must be built-in. Through the years Grand Rapids Grinders have demonstrated the highest quality and unquestioned dependability of performance. Upon this record they have been accorded world-wide acceptance as standard of the industry. Here is precision beyond question.

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MANUFACTURERS OF SURFACE GRINDERS, CUTTER AND TOOL GRINDERS, TAP AND DRILL GRINDERS

GALLMEYER & LIVINGSTON

substantial in some cases. Not until larger consumers of cast step up their melts are cast grades likely to advance in price, and this is not in sight.

New York—Scrap brokers' buying prices are weak and nominally unchanged. Inventories of steel scrap consumers are adequate and most yards have substantial stocks on hand. Open weather has contributed to the free supply of material. Major reason, however, has been lack of important consumer buying.

Buffalo—As the search for buyers continues, prices on steelmaking grades of scrap are off another $1 per ton in this area. The lower ingot rate and accumulating supplies in dealers' yards have resulted in a gloomy view of the market outlook. No immediate signs of a new buying movement by leading consumers are seen. Cast scrap prices are holding nominally on small sales.

Philadelphia—Small buying by the Phoenixville, Pa., consumer at $26, delivered, for No. 2 heavy melting steel and $24, delivered, for No. 2 bundles reflects continued weakness in the district scrap market. Various other grades are off nominally, with No. 1 heavy melting steel, No. 1 bundles and No. 1 busheling at $29 to $30, delivered, electric furnace bundles at $30 to $31, machine shop turnings $17 to $18, mixed borings and turnings $19 to $20, and short shovel turnings $23 to $24.

Low phos structurals and plate are holding nominally at $34, heavy turnings at $28, couplers, springs and wheels at $36 to $37. Cast grades manifest further weakness at $33 to $35, delivered, for No. 1 cupola, and $36 to $37 for heavy breakable cast.

Pittsburgh—Scrap shipments were near the low point for 1953 at year-end. Prices for some grades remained nominal. Despite the depressed market sentiment, scrap dealers expect to see renewed activity in late January.

Cleveland—Prices on steelmaking grades of scrap are off another $1 per ton with No. 1 heavy melting now quoted $28 to $29. Blast furnace grades are down as much as $3 per ton. The market is lifeless with mills continuing on the sidelines. Brokers and dealers think the market will fall still lower before bottom is reached. Not much in the way of buying is seen this month but expectations are business will pick up sharply in February.

Youngstown—The iron and steel scrap trade here had its deadest week since before World War II, with virtually no activity. Prices

Every Foundryman

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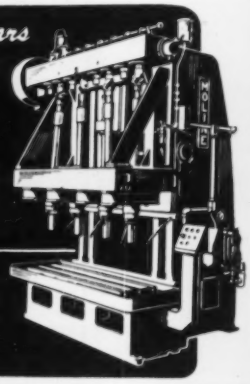

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are purely nominal in absence of important trading.

Cincinnati—A small amount of low phos scrap was sold here at $2 under recent price levels, and this grade now is quoted at $35 to $36 a ton. Other scrap prices are unchanged, but they are nominal.

Chicago—Reduced steelmaking operations at yearend coupled with a healthy inventory restricted scrap buying to a bare minimum last week. Cold and inclement weather was a factor, too, serving to trim yard operations. Softer conditions in eastern markets made Chicago area activity extremely sensitive. Since no recent mill acquisition has involved heavy tonnage it appears consumers are depending on stocks purchased at higher price level.

St. Louis—Scrap market is in the yearend doldrums with major consumers awaiting January price trends before placing orders. No substantial buying is in sight. Despite slack demand prices are holding. Heavy railroad offerings last week failed to weaken them.

Sheets, Strip . . .

Sheet and Strip Prices, Page 496 & 497

Pittsburgh — Some mill schedules have sizable openings for early first quarter orders. Production was slowed during the Christmas and New Year's weekends, reflecting lower shipments in December.

Entering the new year, producers believe yearend liquidation of stocks by consumers is nearly finished.

U. S. Steel Corp. announced a revision in its mill base price for silicon steel sheet used in manufacture of electrical equipment. Revisions constitute an average increase of about 3 per cent. At the same time, U. S. Steel made certain minor revisions in extras covering skelp and galvanized sheets.

Boston—Slow pickup in nickel-chromium stainless steel buying is baffling. Estimates that 85 to 90 per cent of users fabricating straight chromium grades Nov. 1 would go to nickel-bearing specifications are not yet demonstrated. One feasible answer is that 430 stocks are heavier than expected.

Philadelphia—Sheetmakers wound up 1953 with little in the way of arrearages. However, while facilities will not be fully pressed in January, operations are expected to be somewhat higher than in December, reflecting in part deferment of some tonnage originally requested for December shipment. As excess inventories are fairly well worked off, and, in some cases, are below normal

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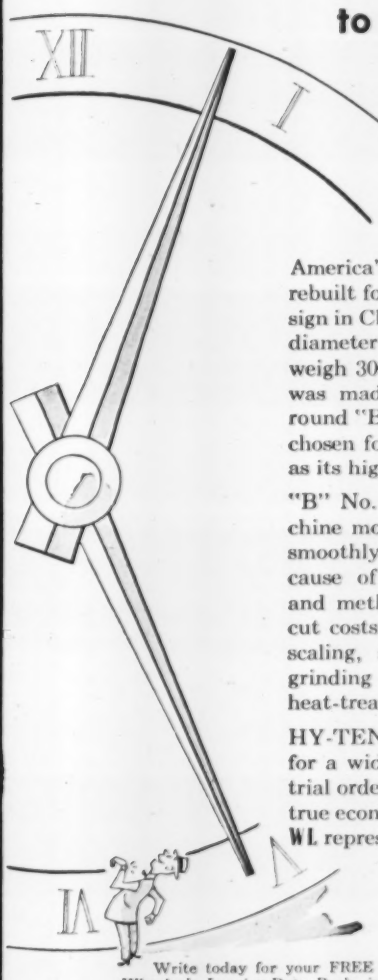

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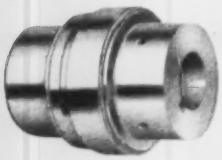

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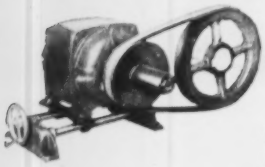

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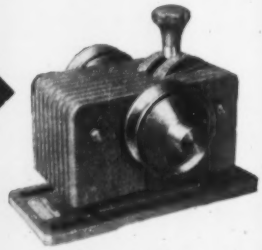

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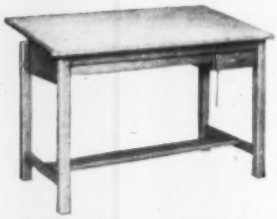

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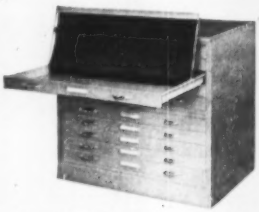

METAL PLAN FILE WITH HINGED COVER

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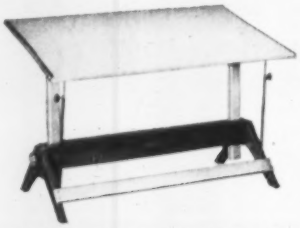

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average, there should be a better volume of specifications as first quarter advances.

Cleveland—Sheetmakers anticipate a pickup in first quarter buying this month. January books are pretty well filled, but February and March tonnage has yet to appear in volume. Generally, producers think first quarter volume will equal that of last quarter, 1953, but they are looking for sharper competitive conditions in the market.

Holiday observance cut sheet production but operations suspension at sheet mills was less severe than at some other facilities. Republic Steel Corp.'s big continuous mill at Cleveland was not affected by the closing down of the blooming mill at that works for about 10 days for extensive repairs. There was a sufficient bank of ingots and slabs to keep the mill engaged.

Semifinished Steel . . .

Semifinished Prices, Page 496

Pittsburgh—Steelmaking operations in the Pittsburgh district slowed down over the Christmas-New Years' holidays. The ingot rate dropped to 74.5 per cent during the week ended Dec. 26, lowest rate for last year, representing a drop of 15.5 per cent from the previous week.

Steel Bars . . .

Bar Prices, Page 496

New York—Hot carbon bar producers entered the new year with little carryover, and without sufficient orders to fully engage facilities in January. They are soliciting some business for this month, but indications are facilities will be operated on a somewhat restricted basis.

While there will be some improvement in business as the month progresses, producers doubt if demand will be brisk for another few weeks. By that time automotive requirements should be picking up; also those from machine tool and equipment builders. Actually the overall stimulating factor should be the working off of excess inventories by consumers generally, with resultant resumption of normal buying. Some consumers, in fact, have more than worked off excesses and are in need of replacements.

Having laid in hot stock, cold bar drawers can promise early deliveries on the common grades and sizes. Some can give two weeks and less. On special specifications for which no hot stock is on hand, cold drawers are virtually out of the market for January.

Boston—Base bar prices are like-

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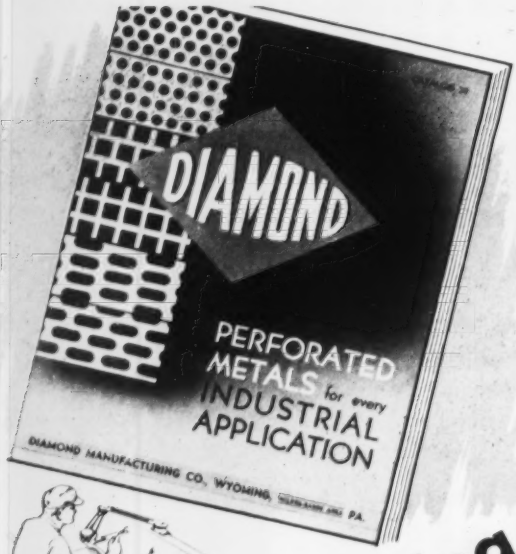

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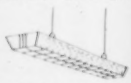
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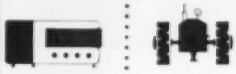

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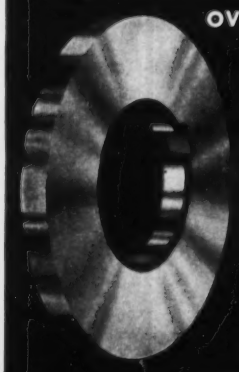

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ly to be subjected to challenge before the year is far advanced. Except possibly wire and buttweld pipe, a buyers' market seems more firmly established in bars, notably small-sized cold-finished and alloy.

Meanwhile, more bar volume is coming out with freight absorption to equalize. Competition is mounting and converter differentials may eventually be endangered.

Consumers are holding back orders for inventory, buying mostly for specific requirements and then asking for prompt delivery. Only where first quarter programs are secure do buyers cover ahead.

Philadelphia—One leading bar producer looks for operations this month to be under those for December, as important gaps last month had been filled in at the expense of January. Certain other producers had similar experience and look for leaner operations this month. Whether all bar mills will experience a lighter month in January than in December remains to be seen.

Pittsburgh—New orders by warehouses and appliance makers are not up to expectations for early first quarter. January will be a low production month. Producers say most incoming orders request delivery from February to April.

Cleveland—Barmakers enter the new year seeking business. For the first time in years the mills are in position to give relatively prompt delivery. There was some carryover from December but for all practical purposes the mills are caught up with back orders. Bookings for January are described as fair but ordering for February and March has been limited. Makers think buying will pick up before close of this month, probably peaking for the quarter in March.

Chicago—Demand for bars is off generally but automotive requirements are strong. The strain on supply has completely disappeared. There is little indication now that farm equipment will increase needs in any substantial way any time soon. Cold-finishing operations have slackened significantly.

Issues General Catalog

Oakland, Calif. — Kaiser Steel Corp. published a 340-page "General Catalog" which gives complete information on the company's iron and steel products, along with illustrations and 117 pages of general technical information and reference tables. The book is being distributed on a limited basis to western architects, engineers and manufacturers.

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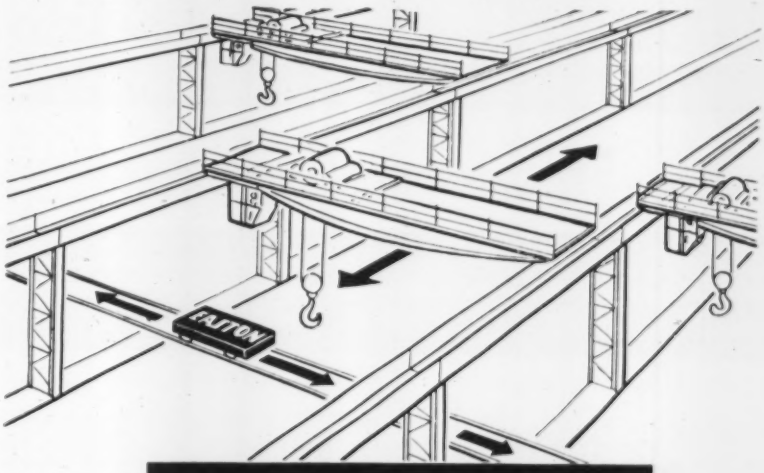

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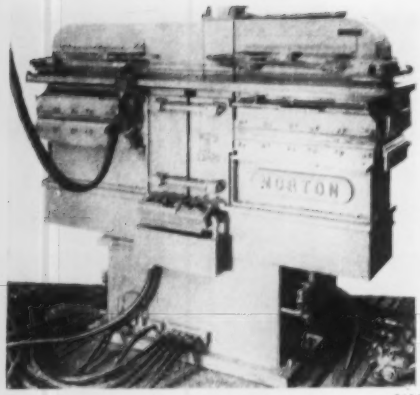

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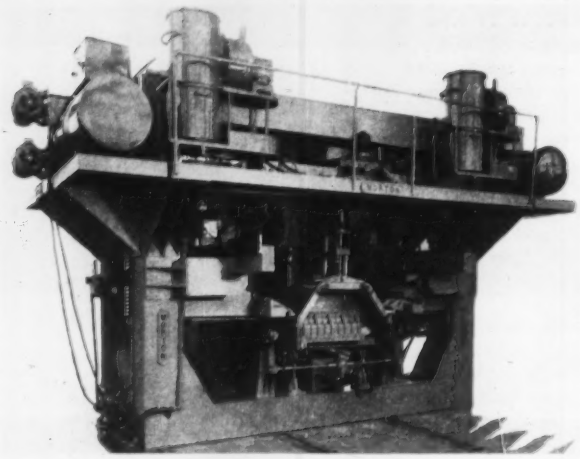

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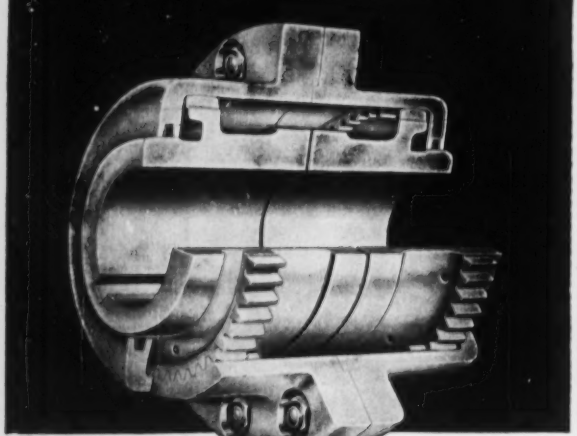

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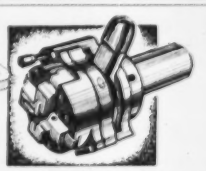

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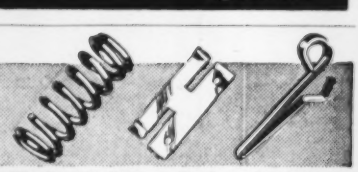

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Names New Export Price

New York—U. S. Steel Export Co. announced new export base price on electrical sheets, cut lengths, 22 gage, of $9.35 per 100 pounds. The new price became effective Dec. 23, and includes freight to New York, Philadelphia and Baltimore.

Plates . . .

Plate Prices, Page 496

Philadelphia—The situation in the plate market is mixed. Some mills believe shipments in January will be off a bit from December. Others expect just the reverse. In no case did plate mills have any important carryovers at end of last year.

In general, excess inventories at consuming plants have been fairly well worked off. This is encouraging for future demand. On the other hand, construction requirements will be subject to further adverse seasonal influences. There is nothing promising in sight from railroad equipment builders, and ship work continues to sag.

Further details concerning the armor plate heat treating building, 100 by 1000 feet, to be erected at the plant of the Lukens Steel Co., Coatesville, Pa., and financed by the Navy, reveal there will be two continuous heat treating furnaces—one to heat plates to 1650 deg. Fahr. and the other to 1250 deg. Fahr., a combination spray quench press for hot plates; roller levelers for cold plates; and shearing, inspection and test preparation equipment. Construction bids on this building are scheduled to open in January. The entire program will cost $10,500,000.

A 5000-ton plate straightening press has been ordered and will be installed in the present heat treating building.

In addition, equipment has been ordered for a new soaking pit at the company's 206-inch rolling mill.

New York—Plate sellers, almost without exception, have space available in January schedules. This indicates most consumers continue in comfortable stock position. Fabricators of water tanks say public lettings have held up better than expected, attributing this, in part, to recent droughts in various sections of the country.

Pittsburgh—Ordering experienced a lull at end of fourth quarter. Warehouses, having rounded out their stocks, reduced new orders. Consumers can obtain all the heavy and light plates they require and are cutting inventories.

Boston—Some higher premium

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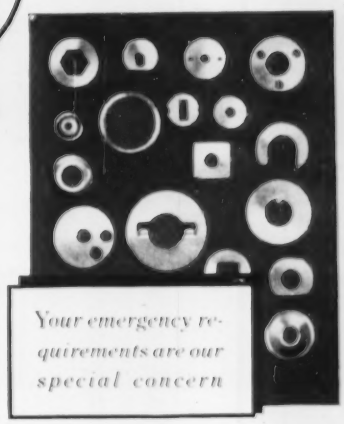

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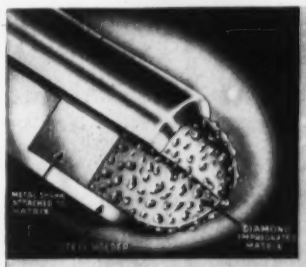

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price plate mills ducked to cover too late. When they finally knocked down prices, most plate shops had bought into first quarter as far as desired at regular mill prices. The cupboard is bare until they get into competition for new tonnage at lower prices.

Demand for carbon plates has eased with consumers linking both delivery and price. Yet, considerable Pittsburgh volume is not absorbing $3 to $3.50 per ton freight, depending on delivery point. Plate users with orders in beyond January are slightly more numerous, but there is no scramble to cover. Floor plates are in ample supply.

Wire . . .

Wire Prices, Page 498

Boston—Premium prices on wire products are being whittled down, including high carbon MB spring grades. Capacity for numerous wire items is not filled for this month, notably cold heading stock. Buying is conservative with inventories and lagging orders for screws and fasteners contributing factors.

Heavier demand for automotive requirements is developing but improvement in manufacturers and other finished wire is likely to be gradually progressive with March probably the best month this quarter.

Pittsburgh — Merchant wire sales are dull. Farmers are buying only to fill certain requirements. Manufacturers are trimming lead time on orders to about one month on the average. Shipments are low but incoming orders have been improving since November.

Tubular Goods . . .

Tubular Goods Prices, Page 499

Philadelphia—The fabricated pipe division of the Claymont, Del., steel producer is expected to resume production around the middle of this month, after having been down for some time.

Pittsburgh—Slowness in sales during early first quarter is due to short lead-time ordering by consumers. Welded tubing sales slowed at year-end, and heavy competition cut into sales of mechanical tubing producers. Seamless tubing sales for oil country use will be strong throughout first quarter.

Tin Plate . . .

Tin Plate Prices, Page 498

New York — Labor negotiations, which have resulted in strikes at plants of American Can Co. and Continental Can Co. over the past several weeks, resume this week. During the suspension tin plate makers were urged to continue production. As a result, mill warehouses are fairly bulging.

Pittsburgh—As the strike at major canmakers continues, tin plate production is slowing. Stocks have piled up at mills in preparation for the usual January upswing in orders. Storage space is becoming exhausted. Mills expect return to capacity operations in late first quarter.

Structural Shapes . . .

Structural Shape Prices, Page 496

Boston—Contracts for fabricated structural steel, 100 tons or more, in New England approximated 55,000 tons in 1953, compared with 81,265 tons in 1952. Decline is attributed to a drop in bridge tonnage, notably halt in Central Artery, Boston, contracts which will be resumed this year.

Fabricated and erected structural steel prices are off an average of 15 per cent compared with one year ago.

New York—Structural fabricators have entered the new year with comfortable backlogs. Some larger shops, especially those in position to handle

(Please Turn to Page 522)

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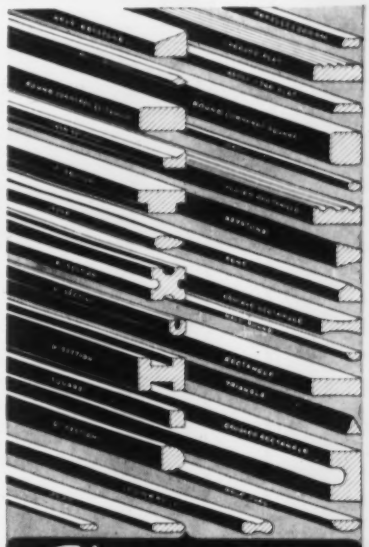

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ORES–COKE–REFRACTORIES

Prices as reported to STEEL; changes shown in italics.

ORES

Lake Superior Iron Ore

(Prices effective July 1, 1953, and thereafter; gross ton, 51.50% iron natural, rail of vessel, lower lake ports.)

Old range bessemer	$10.30
Old range nonbessemer	10.15
Mesabi bessemer	10.05
Mesabi nonbessemer	9.90
Open-hearth lump	11.15
High phosphorus	9.90

The foregoing prices are based on upper lake rail freight rates, lake vessel freight rates, handling and unloading charges, and taxes thereon which were in effect on June 24, 1953, and increases or decreases after such date are for buyer's account.

Eastern Local Iron Ore

Cents per unit deld. E. Pa.

Foundry and basic 56-62% concentrates contract	17.00-18.00

Foreign Iron Ore

Cents per unit, c.i.f. Atlantic ports

Swedish basic, 60 to 68%:	
Spot	nom.
Long-term contract	22.00
North African hematite (spot)	24.00-26.00
Brazilian iron ore, 68-69% (spot)	25.00-26.00

Tungsten Ore

Net ton unit, before duty

Foreign Wolframite, min. 65%, WO_3, good commercial quality	$39-$40
Domestic scheelite, mine	63.00

Manganese Ore

Mn, 48% nearby, $1.18-$1.21 per long ton unit, c.i.f. U. S. ports, duty for buyers' account; shipments against old contracts for 48% ore are being received from some sources at 90-93c.

Chrome Ore

Gross ton, f.o.b. cars, New York, Philadelphia, Baltimore, Charleston, S. C., plus ocean freight differential for delivery to Portland, Oreg., or Tacoma, Wash.:

Indian and African	
48% 2.8:1	$40.00-$42.00
48% 3:1	44.00-46.00
48% no ratio	32.00-34.00
South African Transvaal	
44% no ratio	$27.00-$28.00
48% no ratio	34.00-35.00
Brazilian	
44% 2.5:1 lump	nom. -$32
Domestic	
(Rail nearest seller)	
48% 3:1	$39.00

Molybdenum

Sulphide concentrate, per lb. Mb content, mines, unpacked	$1.00

Antimony Ore

Per unit of Sb content, c.i.f. seaboard

50-60%	$2.40-$2.80
65% min.	$3.40-$3.50

Vanadium Ore

Cents per lb. V_2O_5 content, deld. mills

Domestic	31.00

REFRACTORIES

Fire Clay Brick

High-Heat Duty: Pueblo, Colo., $89; Ashland, Grahn, Hayward, Hitchins, Haldeman, Olive Hill, Ky., Athens, Troup, Tex., Beech Creek, Clearfield, Curwensville, Lock Haven, Lumber, Orviston, West Decatur, Pa., Bessemer, Ala., Farber, Mexico, St. Louis, Vandalia, Mo., Ironton, Oak Hill, Parral, Portsmouth, O., Ottawa, Ill., Stevens Pottery, Ga., Woodbridge, N. J., $109; Salina, Pa., $114; Niles, O., $120; Los Angeles, Pittsburg, Calif., $132.30.

Silica Brick

Standard: Alexandria, Claysburg, Mt. Union, Sproul, Pa., Ensley, Ala., Portsmouth, O., $115; Warren, O., Hays, Pa., $120; Niles, O., $120; E. Chicago, Ind., Joliet, Rockdale, Ill., $125; Cutler, Utah, $116.55; Los Angeles, $122.85.

Insulating Fire Brick

2300° *F:* Massillon, O., $178.50; Clearfield, Pa., $213; Augusta, Ga., Beaver Falls, Zelienople, Pa., Mexico, Mo., $206; Vandalia, Mo., $214.10; Portsmouth, O., $207.50; Bessemer, Ala., $212.80.

Ladle Brick

Dry Pressed: Bessemer, Ala., $64.60; Alsey, Ill., Chester, New Cumberland, W. Va., Freeport, Johnstown, Merrill Station, Pa., Wellsville, O., $77.50; Mexico, Mo., $73.50; Clearfield, Pa., Portsmouth, O., $83; Perla, Ark., $109; Los Angeles, $110.25; Pittsburg, Calif., $111.30.

Sleeves

Reesdale, Pa., $139.70; Johnstown, Pa., $140; Clearfield, Pa., $148.50; St. Louis, $151.80; Athens, Tex., $155.

Nozzles

Reesdale, Pa., $223.50; Johnstown, Pa., $229.20; Clearfield, Pa., $241.40; St. Louis, $247.10; Athens, Tex., $247.70.

Runners

Reesdale, Pa., $174; Johnstown, Pa., $177.80; Clearfield, Pa., $185.50; St. Louis, $187.30; Athens, Tex., $191.80.

High-Alumina Brick

50 Per Cent: Clearfield, Pa., St. Louis, Mexico, Mo., $179; Danville, Ill., $169.30.

60 Per Cent: St. Louis, Mexico, Vandalia, Mo., $223.00; Danville, Ill., $213.20.

70 Per Cent: St. Louis, Mexico, Vandalia, Mo., $225; Danville, Ill., $258; Clearfield, Pa., $252.

Dolomite

Domestic, dead-burned bulk; Billmeyer, Blue Bell, Williams, Plymouth Meeting, York, Pa., Millville, W. Va., Bettsville, Millersville, Martin, Narlo, Gibsonburg, Woodville, O., $14.50; Thornton, McCook, Ill., $14.60, Dolly Siding, Bonne Terre, Mo., $13.65.

Magnesite

Domestic, deadburned bulk; Luning, Nev., $38.

METALLURGICAL COKE

Price per net ton

Beehive Ovens

Connellsville, furnace	$14.50-15.00
Connellsville, foundry	16.50-17.00

Oven Foundry Coke

Kearney, N. J. ovens	$24.00
Everett, Mass., ovens	
New England, deld.	*26.00
Chicago ovens	24.50
Chicago, deld.	26.00
Terre Haute, ovens	24.05
Milwaukee, ovens	25.25
Indianapolis, ovens	24.25
Chicago, deld.	28.12
Cincinnati, deld.	25.85
Painesville, O., ovens	25.50
Cleveland, deld.	27.43
Erie, Pa., ovens	25.00
Birmingham, ovens	22.65
Cincinnati, deld.	27.58
Lone Star, Tex., ovens	18.50
Philadelphia, ovens	23.95
Swedeland, Pa., ovens	23.85
St. Louis, ovens	
St. Louis deld.	26.00
St. Paul, ovens	23.75
Portsmouth, O., ovens	24.00
Cincinnati, deld.	26.62
Detroit, ovens	25.50
Detroit, deld	26.50
Buffalo, deld.	28.08
Flint, deld.	28.23
Pontiac, deld.	27.06
Saginaw, deld.	28.58

*Or within $4.55 freight zone from works.

COAL CHEMICALS

Spot, cents per gallon, ovens

Pure benzol	40.00
Toluol, one deg.	30.00-33.00
Industrial xylol	30.00-33.50

Per ton, bulk, ovens

Sulphate of ammonia	$44-45
Birmingham area	$49.50

Cents per pound, producing point

Phenol, 40 deg. (U.S.P.), tank cars	18.00
c.l. drums	19.00
l.c.l. drums	19.50

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Metallurgical grades, f.o.b. shipping point, in Ill., Ky., net tons, carloads, effective CaF_2 content 72.5%, $44; 70%, $42.50; 60%, $38. Imported, net ton, duty paid, metallurgical grade, $35-$36.

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2½	30	28.00
3	40	27.25
4	40	26.00
5½	40	25.75
6	60	23.25
7, 8, 9, 10	60	21.00
12, 14	72	20.50
16	72	20.00
17	60	20.50
18	72	20.50
20	72	20.00

CARBON

40	100	$8.95
40, 35, 30	110	8.95
30	84	9.10
24	96	8.90
24	72, 84	9.10
20	90	8.95
20	84	9.10
17	72	9.10
17	60	9.50
14	72	9.50
14, 12, 10	60	10.30
8	60	10.55

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CURRENT FERROALLOY QUOTATIONS

Prices as reported to STEEL

MANGANESE ALLOYS

Spiegeleisen: (19-21% Mn, 1-3% Si). Carlot per gross ton $86, Palmerton, Pa.; $87 Clairton and Duquesne, Pa.
(16 to 19% Mn) $84 per ton, Palmerton, Pa; $85 per ton, Clairton and Duquesne, Pa.

Standard Ferromanganese: (Mn 74-76%, C 7% approx.) Base price per net ton $200, Clairton, Duquesne, Johnstown and Sheridan, Pa.; Alloy, W. Va., Ashtabula, Marietta, O.; Sheffield, Ala.; and Portland, Oreg.; add or subtract $2.00 for each 1% or fraction thereof of contained manganese over 76% or under 74%, respectively.
(Mn 79-81%) Lump $208 per net ton, f.o.b. Anaconda or Great Falls, Mont. Add $2.60 for each 1% above 81%; subtract $2.60 for each 1% below 79%, fractions in proportion to nearest 0.1%.

Low-Carbon Ferromanganese, Regular Grade: (Mn 85-90%). Carload, lump, bulk, max. 0.07% C, 27.95c per lb of contained Mn, carload packed 28.7c, ton lots 29.8c, less ton 31.50c. Delivered. Deduct 0.5c for max. 0.15% C grade from above prices, 1c for max. 0.30% C, 1.5c for max 0.50% C, and 4.5c for max 7.5% C—max 7% Si. **Special Grade:** (Mn 90% min, C 0.07% max, P 0.06% max). Add 2.95c to the above prices. Spot, add 0.25c.

Medium-Carbon Ferromanganese: (Mn 80-85, C 1.5% max). Carload, lump, bulk 21.35c per lb of contained Mn, carload packed 22.1c, ton lot 23.2c, less ton 24.4c. Delivered. Spot, add 0.25c.

Manganese metal, 2" x D (Mn 95.5% min, Fe 2% max, Si 1% max, C 0.2% max): Carload, lump, bulk, 36.2c per lb of metal; packed, 36.95c; ton lot 38.45c; less ton lots 40.45c. Delivered. Spot, add 2c.

Electromanganese: Carload, 31.5c; ton lots 33.5c; 250 to 1999 lb, 35.5c. Premium for hydrogen-removed metal, 1.5c per pound, f.o.b. cars Knoxville, Tenn. Freight allowed to St. Louis or to any point east of Mississippi.

Silicomanganese: (Mn 65-68%). Contract, lump, bulk, 1.50% C grade, 18-20% Si, 11.4c per lb of alloy, carload packed, 12.15c, ton lots 13.05c, less ton 14.05c. Freight allowed. For 2% C grade, Si 15-17%, deduct 0.2c from above prices. For 3% C grade, Si 12-14.5%, deduct 0.5c from above prices. Spot, add 0.25c.

TITANIUM ALLOYS

Ferrotitanium, Low-Carbon: (Ti 20-25%, Al 3.5% max, Si 4% max, C 0.10% max). Contract, ton lots 2" x D, $1.50 per lb of contained Ti; less ton $1.55. (Ti 38-43%, Al 8% max, Si 4% max, C 0.10% max). Ton lots $1.35, less ton $1.37, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis. Spot, add 5c.

Ferrotitanium, High-Carbon: (Ti 15-18%, C 6-8%). Contract $177 per net ton, f.o.b. Niagara Falls, N. Y., freight allowed to destinations east of Mississippi river and north of Baltimore and St. Louis.

Ferrotitanium, Medium-Carbon: (Ti 17-21%, C 2-4.5%). Contract $195 per ton, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed.

CHROMIUM ALLOYS

High-Carbon Ferrochrome: Contract, c.l. lump, bulk 24.75c per lb of contained Cr; c.l. packed 25.65c, ton lot 26.80c, less ton 28.20c. Delivered. Spot, add 0.25c.

Low-Carbon Ferrochrome: (Cr 67-72%) Contract, carload, lump, bulk, max. 0.025% C (Simplex) 34.50c per lb contained Cr, 0.03% C 36.50c, 0.04% C 35.50c, 0.06% C 34.50c, 0.10% C 34.00c, 0.15% C 33.75c, 0.20% C 33.50c, 0.50% C 33.25c, 1% C 33.00c, 1.50% C 32.85c, 2% C 32.75c. Carload packed add 1.1c, ton lot 2.2c, less ton add 3.9c. Delivered. Spot, add 0.25c.

Foundry Ferrochrome, High Carbon: (Cr 62-66%, C 5-7%) Contract, c.l. 8 M x D, bulk, 26.25c per lb contained Cr. Packed, c.l. 27.15c, ton 28.50c, less ton 30.25c. Delivered Spot, add 0.25c.

Foundry Ferrochrome, Low Carbon: (Cr 50-54%, Si 28-32%, C 1.25% max). Contract, carload, packed, 8 M x D, 18.35c per lb of alloy; ton lot 19.2c; less ton lot, 20.4c, delivered; spot, add 0.25c.

Low-Carbon Ferrochrome Silicon: (Cr 34-41%, Si 42-49%, C 0.05% max.) Contract, carload, lump, 4" x down and 2" x down, bulk, 25.75c per lb of contained chromium plus 12.4c per pound of contained silicon; 1" x down, bulk 25.90c per pound of contained chromium plus 12.60c per pound of contained silicon. F.o.b. plant; freight allowed to destination.

Ferrochrome Silicon, No. 2: (Cr, 36-39%, Si 26-39%, Al 7-9%, C 0.05% max). 25.75c per lb of contained chrome plus 12.4c per lb of contained silicon plus aluminum 3" x down, delivered.

Chromium Metal: (Min 97% Cr and 1% Fe) contract, 1" x D; packed, max 0.50%, carload $1.12, ton lots $1.14; less ton $1.16. Delivered. Spot, add 5c. Prices on 0.10 per cent carbon grade, add 4c to above prices.

VANADIUM ALLOYS

Ferrovanadium: Open-hearth Grade (V 35-55%, Si 8-12% max, C 3-3.5% max). Contract, any quantity, $3.00 per lb of contained V. Delivered. Spot, add 10c. **Crucible-Special Grades** (V 35-55%, Si 2-3.5% max, C 0.5-1% max). $3.10. **Primos and High Speed Grades** (V 35-55%, Si 1.50% max, C 0.20% max) $3.20.

Grainal: Vanadium Grainal No. 1, $1 per lb; No. 6, 68c; No. 79, 50c, freight allowed.

Vanadium Oxide: Contract, less carload lots $1.28 per lb contained V_2O_5, freight allowed. Spot, add 5c.

SILICON ALLOYS

25-30% Ferrosilicon: Contact, carload, lump bulk, 20.0c per lb of contained Si, packed 21.40c; ton lot 22.50c, f.o.b. Niagara Falls, freight not exceeding St. Louis rate allowed.

50% Ferrosilicon: Contract, carload, lump bulk, 12.40c per lb of contained Si, carload packed 14.0c, ton lot 15.45c, less ton 17.1c. Delivered. Spot, add 0.45c.

Low-Aluminum 50% Ferrosilicon: (Al 0.40% max.) Add 1.3c to 50% ferrosilicon prices.

75% Ferrosilicon: Contract, carload, lump, bulk, 14.3c per lb of contained Si, carload packed 15.6c, ton lot 16.75c, less ton 18.0c. Delivered. Spot, add 0.8c.

90-95% Ferrosilicon: Contract, carload, lump, bulk, 17.0c per lb of contained Si, carload packed 18.2c, ton lot 19.15c, less ton 20.2c. Delivered. Spot, add 0.25c.

Silicon Metal: (Min 97% Si and 1% max Fe) C.l. lump, bulk, regular 18.5c per lb of Si, c.l. packed 19.7c, ton lot 20.6c, less ton 21.6c. Add 0.5c for max. 0.10% calcium grade. Deduct 0.5c for max 2% Fe grade analyzing min 96% Si. Spot, add 0.25c.

Alsifer: (Approx. 20% Al, 40% Si, 40% Fe) Contract, basis f.o.b. Niagara Falls, N. Y., lump, carload, bulk, 9.90c per lb of alloy, ton lots packed 11.30c, 20 to 1999 lb 11.65c, smaller lots 12.15c.

ZIRCONIUM ALLOYS

12-15% Zirconium Alloy: (Zr 12-15%, Si 30-43%, Fe 40-45%, C 0.20% max). Contract, c.l. lump, bulk 8.0c per lb of alloy, c.l. packed 8.75c, ton lot 9.5c, less ton 10.35c. Delivered. Spot, add 0.25c.

35-40% Zirconium Alloy: (Zr 35-40%, Si 47-52%, Fe 8-12%, C 0.50% max). Contract, carload, lump, packed 20.25c per lb of alloy, ton lot 21c, less ton 22.25c. Freight allowed. Spot, add 0.25c.

BORON ALLOYS

Ferroboron: (B 17.50% min, Si 1.50% max, Al 0.50% max, C 0.50% max). Contract, 100 lb or more 1" x D, $1.20 per lb of alloy. Less than 100 lb $1.30. Delivered, spot add 5c. F.o.b. Washington, Pa., prices, 100 lb and over are as follows: Grade A (10-14% B) 85c per pound; Grade B (14-18% B) $1.20; Grade C (19% min B) $1.50.

Borosil: (3 to 4% B, 40 to 45% Si), $5.25 per lb contained B, delivered to destination.

Bortam: (B 1.5-1.9%). Ton lots, 45c per lb; smaller lots, 50c per lb.

Carbortam: (B 1 to 2%) contract, lump, carloads 9.50c per lb, f.o.b. Suspension Bridge, N. Y. freight allowed same as high-carbon ferrotitanium.

CALCIUM ALLOYS

Calcium-Manganese-Silicon: (Ca 16-20%, Mn 14-18% and Si 53-59%). Contract, carload, lump, bulk 20.0c per lb of alloy, carload packed 20.8c ton lot 22.3c, less ton 23.3c. Delivered. Spot, add 0.25c.

Calcium-Silicon: (Ca 30-33%, Si 60-65%, Fe 1.50-3%). Contract, carload, lump, bulk 19.0c per lb of alloy, carload packed 20.2c, ton lot 22.1c, less ton 23.6c. Deld. Spot, add 0.25c.

BRIQUETTED ALLOYS

Chromium Briquets: (Weighing approx. 3¾ lb each and containing exactly 2 lb of Cr). Contract, carload, bulk, 16.25c per lb of briquet, carload packed 16.95c, ton 17.75c, less ton 18.65c. Deld. Add 0.25c for notching. Spot, add 0.25c.

Ferromanganese Briquets: (Weighing approx. 3 lb and containing exactly 2 lb of Mn). Contract, carload, bulk 12.45c per lb of briquet, c.l. packaged 13.25c, ton lot 14.05c, less ton 14.95c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Silicomanganese Briquets: (Weighing approx. 3½ lb and containing exactly 2 lb of Mn and approx. ½ lb of Si). Contract, c.l. bulk 12.65c, per lb of briquet, c.l. packaged 13.45c, ton lot 14.25c, less ton 15.15c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Silicon Briquets: (Large size—weighing approx. 5 lb and containing exactly 2 lb of Si). Contract, carload, bulk 6.95c per lb of briquet. Packed c.l. 7.75c, ton lot 8.85c, less ton 9.45c. Delivered. Spot, add 0.25c.
(Small size—Weighing approx. 2½ lb and containing exactly 1 lb of Si). Carload, bulk 7.1c. Packed c.l. 7.9c, ton lot 8.7c, less ton 9.6c. Delivered. Add 0.25c for notching, small size only. Spot, add 0.25c.

Molybdic-Oxide Briquets: (Containing 2½ lb of Mo each) $1.14 per pound of Mo contained, f.o.b. Langeloth, Pa.

TUNGSTEN ALLOYS

Ferrotungsten: (70-80%). 10,000 lb W or more, $4.10 per lb of contained W; 2000 lb W to 10,000 lb W, $4.20; less than 2000 lb W, $4.32, f.o.b. Niagara Falls, N. Y.

OTHER FERROALLOYS

Ferrocolumbium: (Cb 56-60%, Si 8% max, C 0.4% max.) Contract, ton lot, 2" x D, $6.40 per lb of contained Cb, less ton $6.45. Delivered. Spot, add 10c.

Ferrotantalum—Columbium: (Cb 40% approx., Ta 20% approx., and Cb and Ta 60% min, C 0.30% max) ton lots, 2" x D, $4.75 per lb of contained Cb plus Ta, deld.; less ton lots $4.80.

Silicaz Alloy: (Si 35-40%, Ca 9-11%, Al 6-8%, Zr 3-5%, Ti 9-11%, B 0.55-0.75%). Carload packed 1" x D, 45c per lb of alloy, ton lot 47c, less ton 49c. Delivered.

SMZ Alloy: (Si 60-65%, Mn 5-7%, Zr 5-7%, Fe 20% approx). Contract, carload, packed, ½" x 12 M, 17.5c per lb of alloy, ton lots 18.25c, less ton 19.5c. Deld. Spot, add 0.25c.

Graphidox No. 4: (Si 48-52%, Ca 5-7%, Ti 9-11%). C.l. packed, 17.50c per lb of alloy; ton lots 18.50c; less ton lots 20c, f.o.b. Niagara Falls, N. Y.; freight allowed to St. Louis.

V-5 Foundry Alloy: (Cr 38-42%, Si 17-19%, Mn 8-11%). C.l. packed 15c per lb of alloy; ton lots 16.50c; less ton lots 17.75c, f.o.b., Niagara Falls; freight allowed to St. Louis.

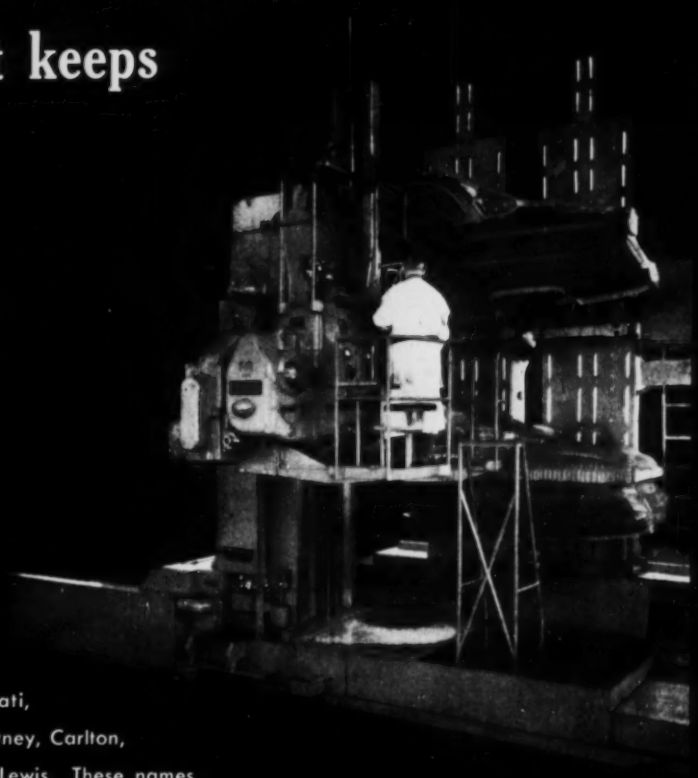
Simanal: (Approx. 20% each Si, Mn, Al; bal. Fe). Lump, carload, bulk 14.50c. Packed c.l. 15.50c, ton lots, 15.75c, less ton lots, 16.25c per lb of alloy. Delivered.

Ferrophosphorus: (23-25% based on 24% P content with unitage of $4 for each 1% of P above or below the base); carloads, f.o.b. sellers' works, Mt. Pleasant, Siglo, Tenn., $90 per gross ton.

Ferromolybdenum: (55-75%). Per lb contained Mo, f.o.b. Langeloth, $1.32 in all sizes except powdered which is $1.41; Washington, Pa., furnace, any quantity $1.32.

Technical Molybdic-Oxide: Per lb. contained Mo, f.o.b. Langeloth, Pa., $1.14 in cans; in bags, $1.13, f.o.b. Langeloth, Pa.; Washington, Pa., $1.13.

a company is known by the machinery it keeps



Jarecki quality is built on men and machines. The men are expert craftsmen whose names will never be news, but the names on Jarecki machinery are known around the world. Each is the finest product in its field.

We acknowledge our indebtedness to names such as Clearing, Bliss, Danly, Cincinnati, Kearney and Trecker, Pratt and Whitney, Carlton, Mattison, and Giddings and Lewis. These names and the machines behind them have helped to make the name Jarecki a symbol of dependability.

JARECKI

engineering tools dies stampings assemblies plating painting

GRAND RAPIDS, MICHIGAN

JARECKI MACHINE AND TOOL CO.
JARECKI PRODUCTS INC.
JARECKI ENGINEERING CO.

IRON AND STEEL SCRAP

Consumer prices, per gross ton, except as otherwise noted, including broker's commision, as reported to STEEL. Changes shown in italics.

STEELMAKING SCRAP COMPOSITE

Dec. 31	$30.83
Dec. 24	31.33
Nov. avg.	35.00
Dec. 1952	43.00
Dec. 1948	43.25

Based on No. 1 heavy melting grade at Pittsburgh, Chicago and eastern Pennsylvania.

PITTSBURGH

(Delivered consumer plant)

No. 1 heavy melting	32.00-33.00
No. 2 heavy melting	28.00-29.00
No. 1 bundles	32.00-33.00
No. 2 bundles	*27.00-28.00*
No. 1 busheling	32.00-33.00
Machine shop turnings	19.00-20.00
Mixed borings, turnings	19.00-20.00
Short shovel turnings	21.00-22.00
Cast iron borings	20.00-21.00
Cut structurals	36.00-37.00
Heavy turnings	30.00-31.00
Punchings & plate scrap	35.00-36.00
Electric furnace bundles	36.00-37.00

Cast Iron Grades

No. 1 cupola	*46.00-47.00*
Charging box cast	*45.00-46.00*
Heavy breakable cast	*44.00-44.00*
Unstripped motor blocks	29.00-30.00
No. 1 machinery cast	44.00-45.00

Railroad Scrap

No. 1 R.R. heavy melt.	34.00-35.00
Rails, 2-ft. and under	46.00-47.00
Rails, 18-in. and under	47.00-48.00
Rails, random lengths	39.00-40.00
Railroad specialties	37.00-38.00

Stainless Steel Scrap
(F.o.b. shipping point)

18-8 bundles & solids	165.00-170.00
18-8 turnings	85.00-90.00
430 bundles & solids	85.00-87.00
430 turnings	60.00-62.00

CLEVELAND

(Delivered consumer plant)

No. 1 heavy melting	*28.00-29.00*
No. 2 heavy melting	*24.00-25.00*
No. 1 bundles	*28.00-29.00*
No. 2 bundles	*24.00-24.00*
No. 1 busheling	*28.00-29.00*
Machine shop turnings	*14.00-15.00*
Mixed borings, turnings	*18.00-19.00*
Short shovel turnings	*18.00-19.00*
Cast iron borings	*18.00-19.00*
Low phos.	*30.00-31.00*
Alloy free, short shovel turnings	*21.00-22.00*
Electric furnace bundles	*30.00-31.00*

Cast Iron Grades

No. 1 cupola	41.00-42.00
Charging box cast	29.00-30.00
Stove plate	36.00-37.00
Heavy breakable cast	25.00-26.00
Unstripped motor blocks	24.00-25.00
Brake shoes	33.00-34.00
Clean auto cast	43.00-44.00
No. 1 wheels	39.00-40.00
Burnt cast	30.50-31.50
Drop broken machinery	43.00-44.00

Railroad Scrap

No. 1 R.R. heavy melt.	*31.00-32.00*
R.R. malleable	*43.00-44.00*
Rails, 3-ft. and under	*44.00-45.00*
Rails, 18 in. and under	*46.00-47.00*
Rails, random lengths	*39.00-40.00*
Cast steel	*36.00-37.00*
Railroad specialties	*36.00-37.00*
Uncut tires	*38.00-39.00*
Angles, splice bars	*42.00-43.00*
Rails, rerolling	*44.00-45.00*

Stainless Steel
(F.o.b. shipping point)

18-8 bundles, solids	nom. 160.00-170.00
18-8 turnings	nom. 70.00-80.00
430 clips, bundles, solids	nom. 70.00
430 turnings	nom. 50.00

YOUNGSTOWN

(Delivered consumer plant)

No. 1 heavy melting	29.00-30.00
No. 2 heavy melting	28.00-29.00
No. 1 bundles	29.00-30.00
No. 2 bundles	27.00-28.00
Machine shop turnings	*15.00-16.00*
Short shovel turnings	*20.00-21.00*
Cast iron borings	*20.00-21.00*
Low phos.	31.00-32.00
Electric furnace bundles	31.00-32.00

Railroad Scrap

No. 1 R.R. heavy melt.	*31.00-32.00*

PHILADELPHIA

(Delivered consumer plant)

No. 1 heavy melting	*29.00-30.00*
No. 2 heavy melting	28.00
No. 1 bundles	*29.00-30.00*
No. 2 bundles	26.00
No. 1 busheling	*29.00-30.00*
Electric furnace bundles	*30.00-31.00*
Machine shop turnings	*17.00-18.00*
Mixed borings, turnings	*19.00-20.00*
Short shovel turnings	*23.00-24.00*
Structurals & plate	*34.00*
Heavy turnings	*28.00*
Couplers, springs, wheels	*36.00-37.00*
Rail crops, 2 ft & under	43.00-44.00

Cast Iron Grades

No. 1 cupola	*33.00-35.00*
Heavy breakable cast	*36.00-37.00*
Unstripped motor blocks	28.00
Drop broken machinery	40.00-41.00

NEW YORK

(Brokers' buying prices)

No. 1 heavy melting	23.00-24.00
No. 2 heavy melting	20.00-20.50
No. 1 bundles	23.00-24.00
No. 2 bundles	18.00-18.50
Machine shop turnings	9.00-10.00
Mixed borings, short turnings	12.00-13.00
Low phos. (structural & plate)	26.00-27.00
Short shovel turnings	13.00-14.00

Cast Iron Grades

No. 1 cupola	29.00-30.00
Unstripped motor blocks	21.00-22.00

Stainless Steel

18-8 sheets, clips, solids	160.00-165.00
18-8 borings, turnings	85.00-90.00
430 sheets, clips, solids	75.00-80.00
410 sheets, clips, solids	65.00-70.00

BOSTON

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	23.00-24.00
No. 2 heavy melting	18.25-19.25
No. 1 bundles	23.00-24.00
No. 2 bundles	16.25-17.25
Machine shop turnings	10.50-11.00
Mixed borings, turnings	12.00-13.00
Short shovel turnings	14.00-14.50
No. 1 cast	29.00-30.00
Mixed cupola cast	27.00-28.00
No. 1 machinery cast	36.00-37.00

CINCINNATI

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	28.00-29.00
No. 2 heavy melting	25.00-26.00
No. 1 bundles	28.00-29.00
No. 2 bundles	22.00-23.00
No. 1 busheling	28.00-29.00
Machine shop turnings	12.00-13.00
Mixed borings, turnings	15.00-16.00
Short shovel turnings	15.00-16.00
Cast iron borings	15.00-16.00
Low phos., 18-in.	*35.00-36.00*

Cast Iron Grades

No. 1 cupola	37.00
Heavy breakable cast	34.00
Charging box cast	34.00
Drop broken machinery	44.00

Railroad Scrap

No. 1 R.R. heavy melt.	30.00-31.00
Malleable	38.00-39.00
Rails, 18-in. and under	44.00-45.00
Rails, random lengths	36.00-37.00

CHICAGO

No. 1 heavy melting	30.00-31.00
No. 2 heavy melting	24.00-25.00
No. 1 factory bundles	32.00-33.00
No. 1 dealer bundles	29.00-30.00
No. 2 bundles	*23.00-24.00*
No. 1 busheling	31.00-32.00
Machine shop turnings	13.00-14.00
Mixed borings, turnings	13.00-14.00
Short shovel turnings	15.00-16.00
Cast iron borings	15.00-16.00
Cut structurals, 3-ft	*33.00-34.00*
Punchings & plate scrap	34.00-35.00
Electric furnace bundles	33.00-34.00

Cast Iron Grades

No. 1 cupola	*32.00-33.00*
Stove plate	26.00-27.00
Unstripped motor blocks	19.00-20.00
Clean auto cast	*35.00-37.00*
Drop broken machine	*36.00-37.00*

Railroad Scrap

No. 1 R.R. heavy melt	33.00-34.00
R.R. malleable	39.00-40.00
Rails, 2-ft. and under	45.00-46.00
Rails, 18-in. and under	47.00-48.00
Angles, splice bars	38.00-39.00
Rails, rerolling	42.00-43.00

Stainless Steel Scrap

18-8 clips & solids	140.00-150.00
18-8 turnings	nom. 60.00
430 clips & solids	60.00
430 turnings	nom. 30.00

DETROIT

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	25.00
No. 2 heavy melting	19.50
No. 1 bundles	26.00
No. 2 bundles	19.00
No. 1 busheling	24.50
Machine shop turnings	12.00
Mixed borings, turnings	12.00
Short shovel turnings	13.50
Punchings & plate scrap	28.00

Cast Iron Grades

No. 1 cupola	36.00
Charging box cast	28.00
Stove plate	30.00
Heavy breakable	27.00
Unstripped motor blocks	22.00
Clean auto cast	38.00
Malleable	38.00

BUFFALO

No. 1 heavy melting	*28.00-29.00*
No. 2 heavy melting	*25.00-25.50*
No. 1 bundles	*28.00-29.00*
No. 2 bundles	*23.00-23.50*
No. 1 busheling	*28.00-29.00*
Machine shop turnings	*15.50-16.50*
Mixed borings, turnings	*17.50-18.00*
Short shovel turnings	*18.50-19.00*
Cast iron borings	*17.50-18.00*
Low phos.	*32.00-33.00*

Cast Iron Grades
(F.o.b. shipping point)

No. 1 cupola	*31.00-32.00*
No. 1 machinery	*36.00-37.00*

Railroad Scrap

Rails, random lengths	*35.00-36.00*
Rails, 2 ft and under	*40.00-41.00*
Railroad specialties	*38.00-39.00*

BIRMINGHAM

No. 1 heavy melting	26.00-26.50
No. 2 heavy melting	24.00-24.50
No. 1 bundles	26.00-26.50
No. 2 bundles	22.00-22.50
Cast iron borings	21.00-22.00
Short shovel turnings	20.50-21.50
Machine shop turnings	19.00
Cut structurals	nom.
Electric furnace bundles	nom.

Cast Iron Grades
(F.o.b. shipping point)

No. 1 cupola	41.00-42.50
Charging box cast	30.00-31.00
Stove plate	38.00-39.00
Bar crops and plate	38.00-39.00
Cut structurals	36.00-37.00
Heavy breakable cast	30.00-31.00
Unstripped motor blocks	34.00-35.00
No. 1 wheels	46.00-47.00

Railroad Scrap

No. 1 R.R. heavy melt.	nom.
Rails, 2-ft. and under	42.00-43.00
Rails, random lengths	38.00-40.00
Angles, splice bars	38.00-39.00
Rails, rerolling	46.00-47.00

ST. LOUIS

(Brokers' buying prices)

No. 1 heavy melting	28.00
No. 2 heavy melting	26.00
No. 1 bundles	28.00
No. 2 bundles	24.00
Machine shop turnings	11.00-12.00
Short shovel turnings	12.00-13.00

Cast Iron Grades

No. 1 cupola	38.00-39.00
Charging box cast	27.00-28.00
Heavy breakable cast	*27.00-28.00*
Unstripped motor blocks	27.00-28.00
Brake shoes	35.00-36.00
Clean auto cast	39.00-40.00
Burnt cast	28.00-29.00

Railroad Scrap

No. 1 R.R. heavy melt.	31.00
Rails, 18-in. and under	44.00-45.00
Rails, random lengths	38.00-39.00
Rails, rerolling	41.00-42.00
Uncut tires	30.00-31.00
Angles, splice bars	35.00-36.00

SEATTLE

(Delivered consumer plant)

No. 1 heavy melting	27.00
No. 2 heavy melting	23.00
No. 1 bundles	24.00
No. 2 bundles	19.00
No. 3 bundles	15.00
Machine shop turnings	12.00
Mixed borings, turnings	12.00
Short shovel turnings	12.00
Electric furnace, No. 1	36.00-38.00

Cast Iron Grades
(F.o.b. shipping point)

No. 1 cupola	30.00-35.00
Heavy breakable cast	25.00-32.00
Unstripped motor blocks	23.00
No. 1 wheels	38.00-40.00
Stove plate	29.00

Railroad Scrap
(Delivered consumer plant)

Rails, random lengths	30.00-34.00

SAN FRANCISCO

No. 1 heavy melting	23.00
No. 2 heavy melting	19.00
No. 1 bundles	22.00
No. 2 bundles	19.00
No. 1 busheling	24.00
Machine shop turnings	7.00
Mixed borings, turnings	7.00
Short shovel turnings	11.00
Cast iron borings	11.00
Cut structurals	28.00
Heavy turnings	11.00
Punchings & plate scrap	28.00
Electric furnace bundles	22.00

Cast Iron Grades

No. 1 cupola	39.00
Charging box cast	35.00
Stove plate	37.00
Heavy breakable cast	36.00
Unstripped motor blocks	29.00
Brake shoes	35.00
Clean auto cast	39.00
No. 1 wheels	39.00
Burnt cast	23.00
Drop broken machinery	43.00

LOS ANGELES

No. 1 heavy melting	23.00
No. 2 heavy melting	19.00
No. 1 bundles	22.00
No. 2 bundles	19.00
Machine shop turnings	7.00

Cast Iron Grades
(F.o.b. shipping point)

No. 1 cupola	40.00-41.00

HAMILTON, ONT.

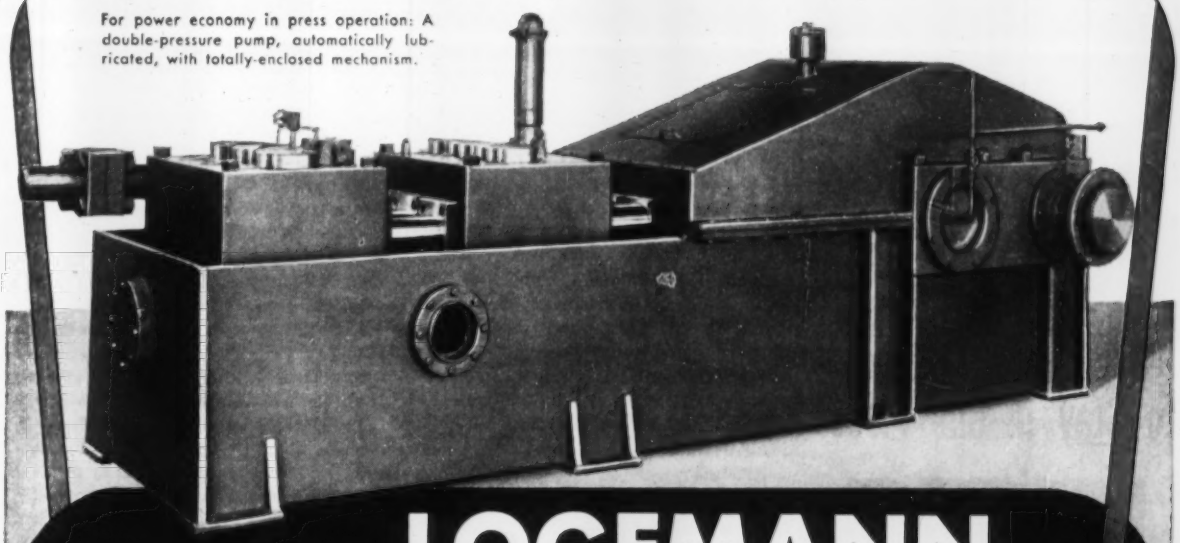
(Delivered prices)

Heavy melting	$32.50
No. 1 bundles	32.50
No. 2 bundles	32.00
Mechanical bundles	30.50
Mixed steel scrap	28.50
Mixed borings, turnings	20.00
Rails, remelting	32.50
Rails, rerolling	41.50
Busheling	26.50
Busheling new factory:	
Prep'd	30.50
Unprep'd	28.50
Short steel turnings	20.00

Cast Iron Grades†

No. 1 machinery cast	46.00

†F.o.b. shipping point.



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Logemann Brothers offer a complete line of specially-designed High Pressure Pumps in a wide range of sizes featuring both single and double pressure types. Both vertical and horizontal styles are proving highly successful in press and accumulator operations and for hydrostatic test purposes.

Pressures range from approximately 2,000 p.s.i. to in excess of 50,000 p.s.i.

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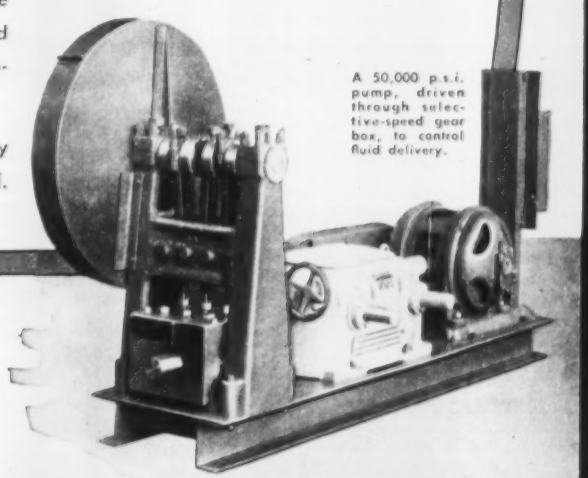

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Strong, lightweight Pla-Tank Resin-Bonded Glass Laminate Tanks are now — and always have been — molded in one piece. Several years ago we started making tanks over a mold after our engineers recommended this as the best production method. Since then, our customers have been telling us that you can't beat one-piece construction.

Frankly, we could assemble sheets and corners for less money — but we sincerely believe they'd be worth lots less as a tank.

One-piece PLA-TANK tanks take more abuse . . . last longer. There's no chance of coming apart at the seams. And PLA-TANK gives you a homogeneous tank wall as opposed to tanks with varying resistances due to adhesives used in the corners. Personal attention during manufacture to each square inch of surface insures against weakening dry spots and brittle resin build-ups.

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Even though individual molds are used, we can offer 269 standard sizes of cylindrical and rectangular tanks . . . all available for quick delivery without mold charges!

You can be sure of better, longer service with PLA-TANK — the FIRST name in Chemical Resistant Laminates.

Write for free data file sheets

THE Chemical CORPORATION

56 Waltham Ave., Springfield 9, Mass.

Structural Shapes . . .

(*Concluded from Page* 515)

bridgework, are booked months ahead, although able to work in some tonnages for fairly early delivery where specifications permit. While 1954 may not equal the year just ended, fabricators are cheerful over prospects.

Philadelphia—Most shape makers are entering the new year with good tonnage for January. Production will be as good as December's. There is not the stringency noted a few months ago in standard shapes or that noted even a month ago in the heavier wide flange sections. However, most producers are in comfortable position and look for business to increase throughout first quarter and beyond.

Fasteners . . .

Bolt, Nut, Rivet Prices, Page 499

New York—Bolt and nut makers expect the new year to get off to a slow start. Most buyers have fairly good inventories and there doesn't seem to be enough new business in sight to warrant an early sharp pick-up. Last month was perhaps the slowest period among bolt and nut manufacturers in recent years, due in part to consumer inventories and to spotty demand for end-use products and requirements of bolt and nut buyers.

Building needs were fairly sustained despite seasonal influences, but requirements for fasteners for manufacturing assemblies were definitely slow.

Reinforcing Bars . . .

Reinforcing Bar Prices, Page 496

Chicago—Current decline in consumption of reinforcing steel, viewed as mostly seasonal, is not dimming 1954 prospects. Outlook for highway work is particularly bright. Cook county, Illinois, for example, is laying out a construction and improvement program costing over $44 million. Of this, $32.5 million are for superhighways and $12 million for improving nearly 70 miles of existing roadways. These involve bridges.

Boston—Concrete reinforcing steel bar sales are again back on a competitive price basis. Distributors' stocks are ample for somewhat heavier demand and if a bridge builder or contractor shops around he can usually strike a lower price. At mill level prices are holding, but fabricating extras are under pressure.

Pittsburgh—Reinforcing bar sales, although strong, are subject to increasing competition among producers.

Iron Ore . . .

Iron Ore Prices, Page 517

Cleveland—Consumption of Lake Superior iron ore in November totaled 7,521,886 gross tons, reports the Lake Superior Iron Ore Association. This was a decline compared with 8,131,437 tons in October, and was down from the 7,816,238 tons consumed in November, 1952

Cumulative consumption in the first 11 months of last year was 87,865,866 gross tons, comparing with 70,120,299 tons in the like period of 1952.

On Dec. 1 total stocks of ore on Lake Erie docks and at furnaces were 54,989,711 gross tons. On Nov. 1 stocks amounted to 55,698,837 tons, and on Dec. 1, 1952, a total of 51,207,577 tons was held at furnaces and docks.

Pig Iron . . .

Pig Iron Prices, Page 500

New York—Having gone through a particularly sluggish period, pig iron sellers are inclined to believe any change from now on will be upward. Consumer operations this month should be better, and while it is doubtful if business in January will show much improvement over the preholiday period, the gain on a monthly basis should be definitely better. No real spurt in activity, however, is anticipated much before February.

Buffalo—Pig iron production held at 78 per cent of capacity over the holidays although coke ovens and blast furnaces were on reduced schedules. Uncertainty clouds the outlook. Lack of buying interest is apparent. Automotive melters are still the leading buyers of merchant iron.

Philadelphia—Pig iron sellers are hopeful the worst is past. Various foundries are back to four and five day week operation, following suspension for a week or more during the holidays. With more iron being consumed shipments should improve. Pig iron supplies are plentiful and buying is likely to be hand-to-mouth for a while.

Chicago—Foundry operations finished the year at low ebb, probably not more than 50 per cent of capacity. Holiday shutdowns ranged from a few days to two weeks. Reduction of iron inventories is continuing. It appears the safe inventory level is now a lower figure than had been thought desirable 60 days ago.

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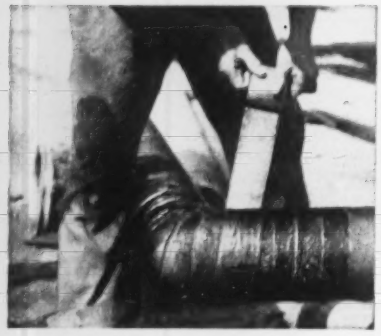

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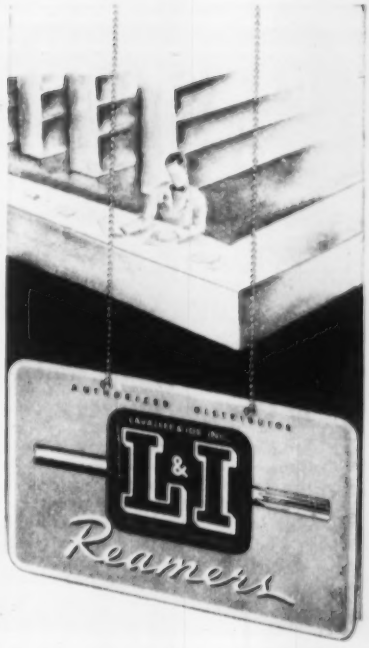

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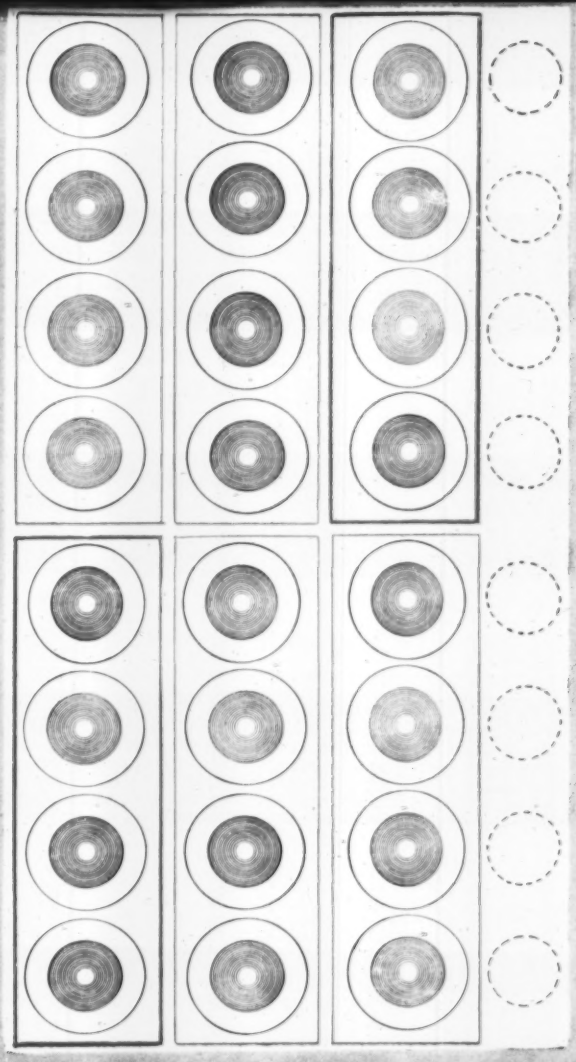

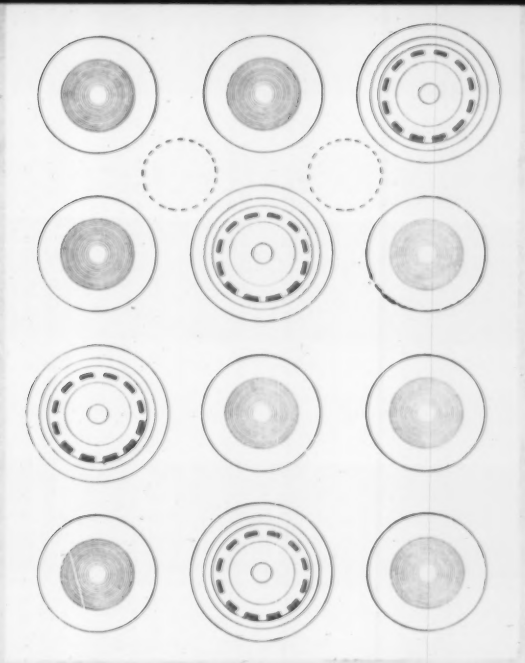

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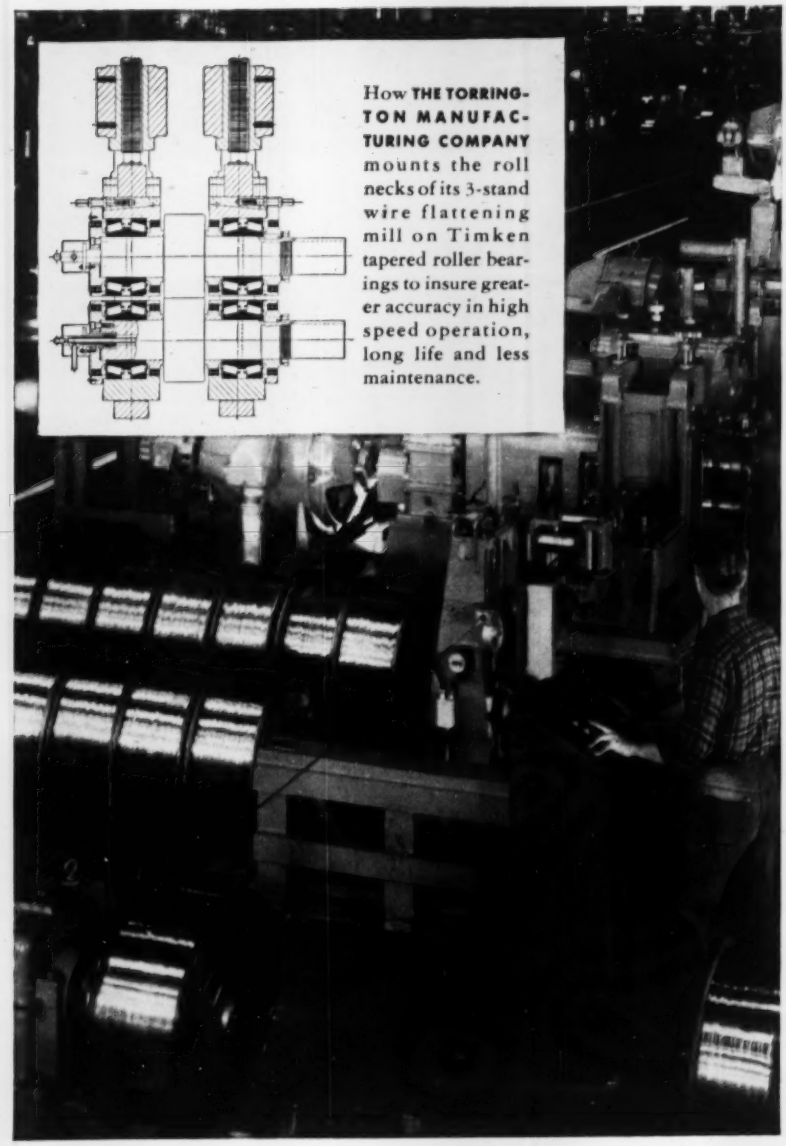
...with help of TIMKEN® bearings



How **THE TORRINGTON MANUFACTURING COMPANY** mounts the roll necks of its 3-stand wire flattening mill on Timken tapered roller bearings to insure greater accuracy in high speed operation, long life and less maintenance.

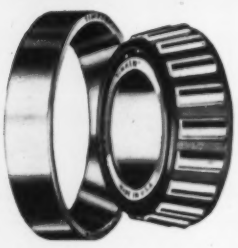
THE 3-stand wire flattening mill pictured at left, in operation at the Ansonia, Conn. branch of The American Brass Company, rolls up to 2000 feet of brass or copper wire per minute. It reduces the wire and changes its shape by rolling both flatwise and edgewise. To maintain accuracy at high speeds, The Torrington Manufacturing Company uses 62 Timken® tapered roller bearings on the roll necks and on the reduction drives.

Timken bearings hold the roll necks rigid, insure greater accuracy in the finished product. That's because Timken bearings take both the radial and thrust loads in any combination. They also reduce the amount of power required to run the mill because the true rolling motion and smooth surface finish of Timken bearings practically eliminate friction.

On the reduction gears, Timken bearings keep shafts in proper alignment, keep gears meshing accurately with a minimum of wear. There's less chance of breakdowns caused by excessive gear wear.

Always specify Timken bearings in the equipment you build or buy. Look for the trade-mark "Timken" stamped on every bearing. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

This symbol on a product means its bearings are the best.



TIMKEN

TRADE MARK REG. U.S. PAT. OFF.

TAPERED ROLLER BEARINGS

IT'S TIMKEN BEARINGS FOR VALUE!

To get the best value in bearings you may find this simple formula helpful:

$$Value = \frac{quality + service + public\ acceptance}{price}$$

Obviously a big advantage *above* the line gives you more value than a small one *below*. No other bearing can match the uniform high quality, engineering and field service and overwhelming public acceptance you get with Timken bearings.

NOT JUST A BALL ○ NOT JUST A ROLLER ▭ THE TIMKEN TAPERED ROLLER ▭ BEARING TAKES RADIAL AND THRUST ◫ LOADS OR ANY COMBINATION